

**Coop's  
Satellite  
Digest**

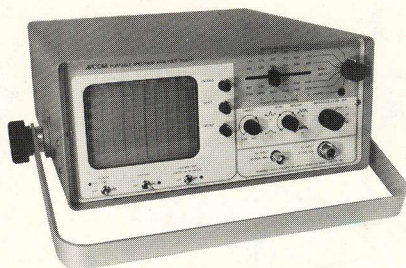


June 15, 1986

Antenna Basics: Part III  
The Peter Sutro Equation  
WTBS To Market CNN To TVRO



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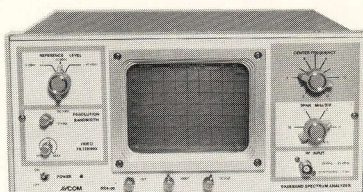


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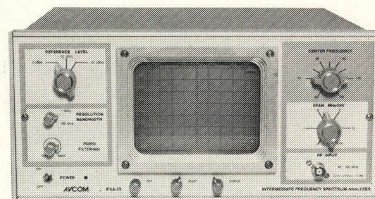
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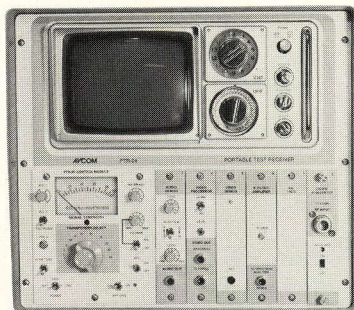
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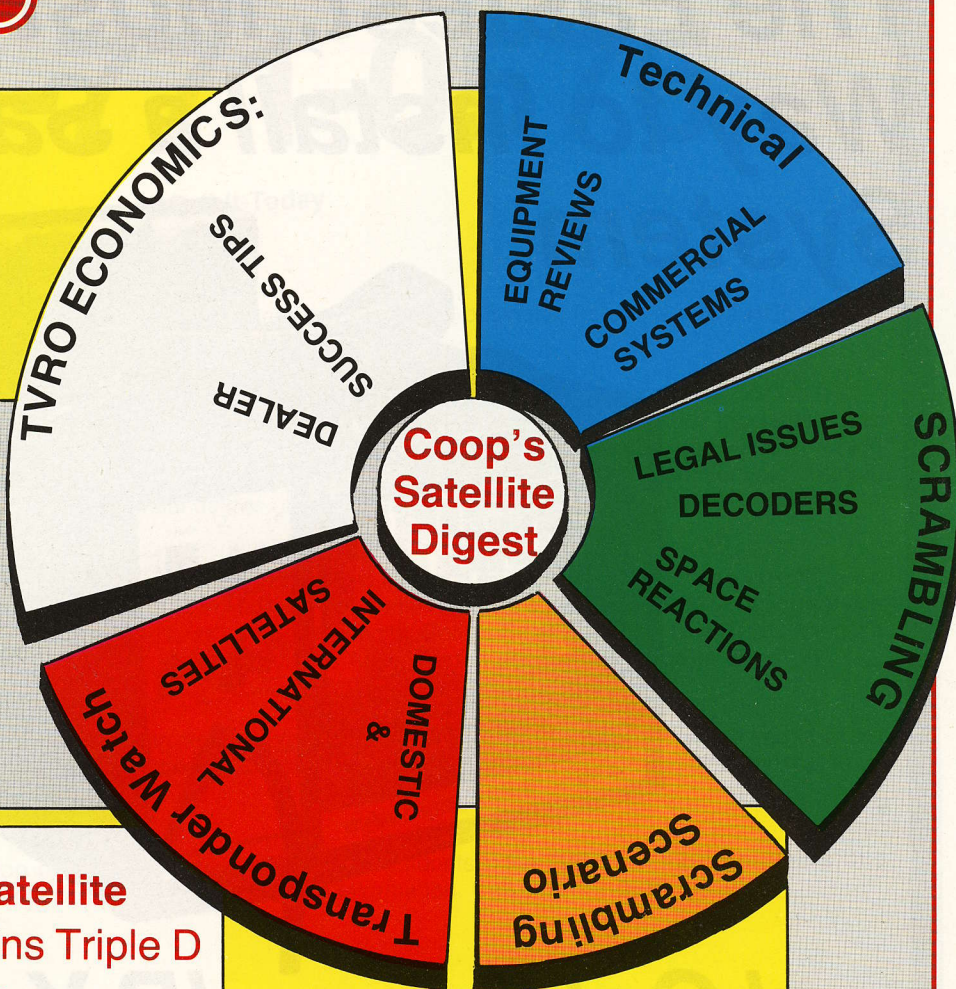
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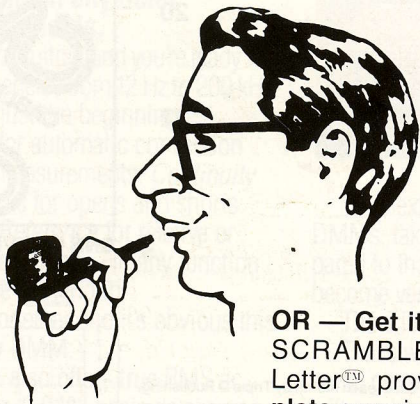
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# JUNE 1986

# COOP'S

# SATELLITE DIGEST

**OUR COVER**/Peter C. Sutro, a 'senior force' within the home TVRO industry, with the new Laux Beta series antenna (left) which he recently introduced to European Ku band distribution after proving it in the US (see story, this issue).



Editor's View . . . . . 6

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## COOP'S COMMENTS . . . . . 6

Amateur Night With Captain Midnight

## THE PETER SUTRO EQUATION . . . . . 10

## WTBS TO MARKET CNN TO TVRO . . . . . 12

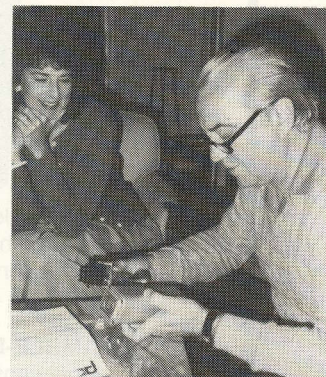
## ANTENNA BASICS: Part III . . . . . 16

Jim Vines

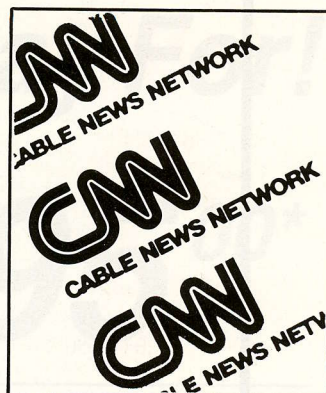
## CORRESPONDENCE . . . . . 19

## TRANSPONDER WATCH . . . . . 20

## ADVERTISER INDEX . . . . . 32



Sutro Equation . . . . . 10



CNN On TVRO . . . . . 12

**COOP'S SATELLITE DIGEST** is published on the 15th of each month by Triple D Publishing, Incorporated (P.O. Box 2384, Shelby NC 28151-2384). All advertising and subscription requests should be directed to Triple D Publishing. CSD has been issued monthly since October of 1979 with Bob Cooper, Jr., as Editor In Chief. Coop launched the home TVRO industry by building the first FCC licensed home TVRO in 1976. This is the 107th edition of CSD. Subscription rates are \$60 per year where US zip-codes apply, \$65 (US funds) for Canada and Mexico, and \$75 (US funds) elsewhere. All non-US copies are sent AIRmail, worldwide. COOP'S-SATELLITE DIGEST table of contents and heads are protected by US and foreign copyrights and any reproduction without the expressed permission of Triple D is prohibited. Second class postage paid at Shelby, NC, and additional offices. Application to mail at second class postage rates is pending at Shelby, NC, and additional offices. **NOTE:** Letters to CSD, technical articles, and new product announcements should be mailed to Coop at West Indies Video, P.O. Box 100858, Ft. Lauderdale, FL 33310 (305/771-0505).

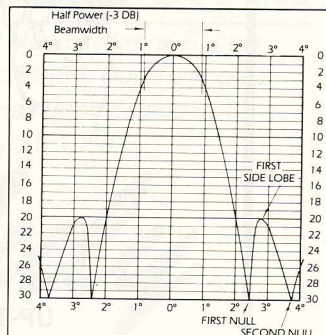


Diagram 15 — Idealized 4-gHz Plot For Theoretically Perfect 10-foot Diameter TVRO Antenna



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# Coop's Comments



## Turner's Pricing

I recently had the opportunity to review some remarks made by Turner's boy Ted at our SPACE trade show in Orlando, Florida, during November of 1983. Turner was a guest of SPACE, and he flew down to Orlando with wife Jane to attend our show and to walk the aisles and meet and greet those TVRO entrepreneurs who admired what he had done for the American broadcasting system. We wrote about this extensively in our December 1983 issue.

A friend of mine, Holmes Hardin of Canaan Communications, believes that some of cable's big boys (such as John Malone of TCI) 'took Ted to the wood shed and paddled his behind' recently. For your own edification, Turner recently made some sort of business deal with Malone/TCI relative to obtaining funding for Turner's recent \$1B plus entry into Hollywood. Malone pledged financial support to Ted but in the process Turner had to apparently restate his loyalty to the cable TV camp. In other words, according to Holmes, Ted was told to stop being coy and encouraging TVRO people.

In this issue we look at the CNN, Incorporated affiliate contract with cable system distributors who will shortly be selling CNN, CNN Headline, and ultimately WTBS to backyard dish owners in their areas. The contract forms were issued last November and have been kicking around for our study since shortly after they were mailed. Basically, the contracts spell out how Turner is encouraging cable affiliates to handle TVRO sales. It is not all pleasant news.

What jumps out most dramatically is the pricing schedule. Turner will be charging cable affiliates \$1 per month for each home that takes CNN and CNN Headline service for TVRO dish use. When WTBS comes on line, the additional charge for the super station will be no less than 20 cents per month and it might go higher than that depending upon how the copyright snafu for super stations shakes out. That, dear friends, is the wholesale rate of CNN; the retail rate will be set by the cable affiliate. It is fair to assume that while rates will vary from cable operator to cable operator, we won't see the CNN plus CNN Headline plus WTBS package offered very many places for under \$2 per month. Even \$3.00 per month would not be uncommon. Remember, these are for advertising supported services.

If somebody such as TCI offers a basic package of say 10 services for \$10 per month, and the three-channel Turner subset of services amounts to let's say \$3 of those \$10, what does that suggest is happening to cable's carefully controlled pricing scheme for home TVRO? More important, when the cable company provides its own hardware and system to receive CNN, CNN Headline, and WTBS, the wholesale rates for these three services is closer to \$.40 per month than it is \$1.20. In the case of the home dish user, he provides his own headend system, his own dish, receiver, and even his own descrambler. Clearly the scrambling battle is boiling down to pricing and the way the pricing is controlled.

The ultimate package most see evolving will have between 10 and 15 basic services, and the pricing per month will average close to \$1 per channel at the retail level. On the surface, that doesn't seem like such a tragedy although those who continue with the mistaken belief that the presence of advertising on a service such as CNN should make it totally free will debate the merits of being charged for programming for years to come. Perhaps our problem here is with the black and white world of television we all grew up with. In the olden days, if a television program carried advertising, we thought of it as free TV although as our continuing series, *The Roots* of TVRO points out, advertising-supported television has never been free. In fact, it may have been the most expensive television we ever received if you take the cost of every product in the marketplace and compute a 1% to 4% advertising allowance into each product. If you spend \$1,000 per month for consumer goods (food, clothing, banking, etc.), then you are already paying between \$10 and \$40 per month for the ability to watch television, listen to the radio, read newspapers and magazines, and look at billboards. A \$10,000 car purchase can include up to \$400 in advertising related expenses. The list is endless, and there is no such thing as free television or free radio.

In more recent times, we agreed to spend perhaps \$10 a month for a single channel such as HBO. We called that pay television because we received a direct bill each month which we could relate to the programming we received. The costs were not hidden, they were right up-front where we could see them. People send \$20 to Keith Lamonica to become a part of his FM American Family for a year. That works out to \$.07 per day to listen to Lamonica on your satellite-radio. No; not even Lamonica is free.

Programming that costs money was pay and programming that was advertiser supported was free; everything about it was black or white. There were no grey tones involved. Then along came CNN, ESPN, and even CBN. They attempted first to be free, to only sell advertising. It didn't work; their operating costs were higher than their revenues. So they began charging a modest fee per month to help defray their costs. The concept caught on with only minor resistance because cable operators were bright enough to realize that a dime or two dimes a month for a channel service such as CNN or *The Weather Channel* was a good deal for them. If they spent perhaps \$4 a month to supply a basic service which they could resell for \$9 or \$10 to their cable customers, they could make money. Each service wanted to be carried by as many cable systems and to be seen in as many cable homes as possible so each service worked hard to stand out, to provide worthwhile service, and to entice the cable operator. We saw the evolution of a third, middle ground of programming service where there was a direct charge per subscriber plus an indirect advertising source of revenue which also ultimately cost each subscriber some additional



money.

TVRO ran counter to the evolution here; we acted willing to pay the indirect cost for advertising but initially misunderstood the importance of also paying the direct cost for the delivery of the service. We were the ultimate grey area technology but we refused to accept our position with the proper business attitude. Some in our industry persist in believing that we owe nobody for the programming itself.

Many years ago the US Supreme Court ruled that a cable television antenna tower was 'simply an extension of the home viewer/subscriber's own television'; that the fact the cable subscriber had elected to connect his television receiver to a large community shared antenna rather than install his own private antenna of inferior capabilities did not change the status of his reception. The issue before the court dealt with copyright. Was the cable system displaying for profit the TV programming it received or was it merely acting as an extension of the subscriber's TV set? The court decided against the program rights as owners and in favor of the home subscriber. That was an important, precedent setting case for cable and the analogy to today's home dish system should not be lost.

The home dish owner has elected on his own to spend additional money for a better TV antenna. With his better (satellite) TV antenna, he can receive programs which he could not otherwise receive. If he can install a normal TV antenna and receive programs, he already has access to free TV. With his better (satellite) antenna, he also has access to pay-TV and to grey-area TV; that programming that costs him money directly and indirectly. It is the same mix of programming he could expect to receive if he subscribed to a local cable system, or if such cable was available to him. He will pay for it at approximately the same ratio and at approximately the same rate as he would if he subscribed to cable.

In my view, the argument that you have spent money for a better antenna and you should therefore be entitled to a wholesale rate is a false issue. It sounds good, but defies real logic. It is one of those statements that sounds good if you say it fast and don't stop to think what you have said. You are in general commerce entitled to a lower or wholesale rate only because you reduce the costs of the seller. Your antenna does not do that; the programmer does not pay for the cable firm's antennas either. You get 10 pencils for 20 cents each when one pencil costs 30 cents because the manufacturer has packaged 10 pencils in a master pack. You are saving the retailer money because with one sales ticket he sells you the products. He is willing to reduce his profit per pencil because you are lowering his costs. There is no other reason.

If we want lower rates for Turner's products, we have to lower Turner's costs of dealing with us. Because his wholesale rates are known to us (see feature report in this issue), we know that if we could somehow act like cable systems and buy in bulk, we could cut our costs per program channel approximately in half. The challenge before us is to figure out how to do that.

Our emphasis to date has been on battling the reality of scrambling and acting like wounded ducks because somebody has plucked our tail feathers. We have even encouraged and sanctioned our trade association to carry this banner for us. The reality is that for a brief period in history, some Americans really did have something approaching free TV; those cable created programs which carry no or very little advertising, directed at per-subscriber distribution. Now that has changed; that anomaly is past and a marketplace adjustment has occurred to bring TVRO users into the main stream of commerce. We may not like our new role in commerce, but it is the right one if the system itself is to work.

### The Caribbean Problem

Several years ago, we devoted a substantial portion of an issue of CSD to the explosion in satellite TV receiving systems in the Caribbean, Central America, and South America. We have touched on the subject numerous times since and most recently wrote about the spe-

cial problems facing members of something called the Caribbean Hotel Association or CHA.

Right or wrong, satellite TV has changed the face of American and other tourism in the Caribbean and Mexico. Five years ago you would virtually never find a hotel on Aruba or St. Martin, for example, with a TV set in the room. Perhaps there would be one in the bar, tuned to the local station. But not very often. According to CHA, more hotels have TV sets in their rooms than do not, and the trend has been growing very rapidly in the past two years. In fact, even with the scrambling, the rate of growth has quickened during 1986.

The TV sets bring in services such as CNN, ESPN, USA, and even WTBS and HBO. Yes, all of these and most of the other desirable services are now scrambling. Yes, the more advanced hotels are going to the states that are ordering up VC2000 units by pretending they are in Miami or some place in Wyoming. But many more are simply 'changing channels' to stay ahead of the scrambling, and worrying what will happen a year from now.

A few of the programmers, Turner's bunch most notably, are dollar-interested in actually serving this market. Most however figure another 100,000 paying rooms or so are simply not worth the trouble involved. Now, what is that trouble?

1) First, we have the software problem. VC2000 units are forbidden for export, except into Canada, Puerto Rico, and the (American) Virgin Islands. M/A-Com has asked the Department of Commerce to approve export of the units to Mexico but even when that approval comes through, more than 20 additional countries or territories will still be on the banned list.

2) Second, we have the software problem. To sell movies on HBO in Barbados, legally, HBO has to acquire the distribution rights for the movie in Barbados.

HBO now bargains for distribution rates in the USA. It pays so much per film based upon several factors, including how many potential outlets (homes) can view the movie through them. Another factor is the theater run in the area where HBO reaches; a movie theater will never pay big bucks for 'Smokey And The Bandit' after the film has been shown on HBO in a town that has HBO on the cable system. The same factor applies to Barbados; films will never again rent for theater showing in Barbados once they have appeared legally on either cable or home TVRO dishes in Barbados.

So how many homes might HBO reach in Barbados?

If Cayman Island had a cable system, and that cable system had 3,000 subscribers, HBO would be able to negotiate payment for 'Smokey And The Bandit' based upon 3,000 known potential viewers on Cayman. Cayman has no cable system, but by most recent counts it may have 500 home dish systems. Many of those dishes are installed at apartments, condos, and hotels. The total number of viewers possible there could top 2,000 or more; roughly 1/7th of the population of the island. Does that give HBO sufficient data to negotiate a fair rental rate for 'Smokey And The Bandit' for Cayman Island? Perhaps.

There are three separate categories of satellite TV users in the Caribbean, each of which is significant:

1) Cable systems. (Santo Domingo in the Dominican Republic has more than 55,000 subscribers now; just one example.)

2) Hotels and other SMATV-fed systems (CHA says more than 100,000 rooms are now TV equipped and they presume virtually all of these are satellite connected.)

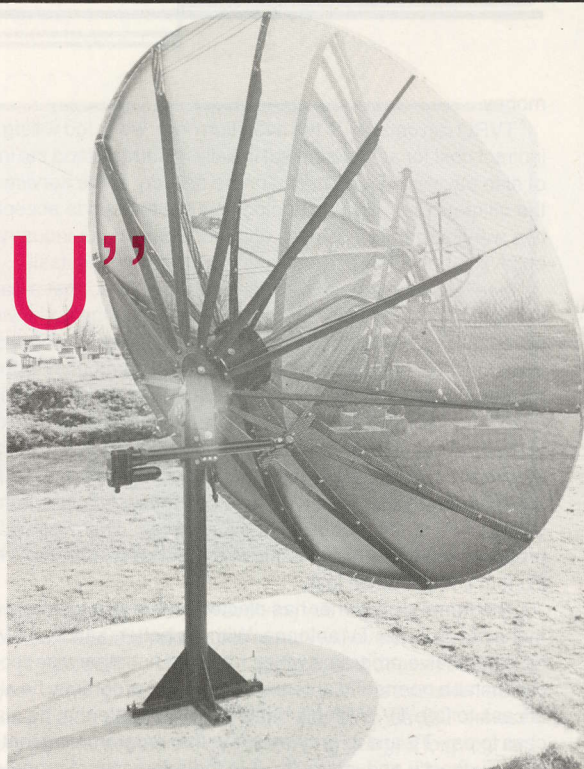
3) Private, home systems. (Nobody has even an estimate here but another 100,000 systems seems like a reasonable estimate given the actual dish counts in places like Jamaica, Cayman, and St. Martin.)



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The sum of all these might go upwards of 400,000 TV sets. That seems like a big number to most of us, but to a firm like Turner with 30,000,000 plus homes connected or HBO with 15,000,000 homes connected, it is not that enticing. Especially when reaching these TV sets will require lots of study and number research, plus negotiations for perhaps 20 to 25 different countries or territories just to arrive at contract rights to resell in each of these areas. In some areas such as Surinam, where perhaps a dozen dishes exist, the rights will simply not be worth the trouble of negotiation, so some of the smaller or poorer countries will never have HBO legally available.

There is a very slow recognition here that there is a market of some size outside of the United States. And that if a service such as CNN wants to work at it, there are additional dollars available to them.

None of this is happening very fast however and most of the programming services prefer to ignore this marketplace rather than coming to grips with it. So a suggestion. There is a hole here in marketing which a third party marketing firm could fill. Here is how I see it working.

- 1) Set up a Caribbean marketing firm to deal with distribution of HBO, CNN, etc. outside of the USA. Negotiate exclusive 20 year rights with as many programmers as necessary.
- 2) Be responsible for handling all negotiations on behalf of HBO and CNN to acquire for them rights to sell in countries such as Cayman and Barbados.
- 3) Once the rights have been granted, then go to work selling those services to cable, hotels, and private homes in those countries where rights have been secured.

The work here suits a specialty firm established just for marketing in this part of the world. From HBO's vantage point, this specialty firm would be like a master distributor with certain clearly defined marketing rights for specified areas of the world. By doing all of the rights-negotiation and sales work on behalf of HBO and other services your firm would represent, you would be performing a service which would have real value. That means you could collect money for that service. By having an exclusive 20-year right to represent say Turner in the Caribbean, you'd be protected long enough to get your money back.

If the programmers themselves refuse to come to grips with the Caribbean and Central American problem, it is time for a third party to tackle the problem. By representing a dozen or so services out of one house there would be considerable economies of scale which would apply. I think it is a good business with a sizeable potential, and I encourage someone to get busy as soon as possible. Time is awasting.

#### Peter Sutro

On our front cover this month is a carefully posed picture of Peter C. Sutro. Peter doesn't usually pose like this.

Through the years that I have known Peter, I have found him to be one of the more innovative people in TVRO. A short feature article in this issue attempts to recognize some of his contributions to TVRO. Our placing of Peter on the front cover is long overdue as I think you will agree after reading the report.

Patti and I flew to New Jersey to visit with Peter in mid-April, shortly after some of you attended the Ku-band show in Nashville. Peter had been after me to fly up for an overnight visit for months; he wanted me to see his latest system, a T-band or sub-channel package of equipment for distributing premium service channels secretly within a motel or apartment complex. "I'll invite a few people over to visit with you, while you are here," he ventured. By the time Patti and I arrived, the invitation list was well past 20 and Peter's Marina had abandoned modest luncheon plans in favor of a full catered luncheon affair. I had been promising Patti that a meal prepared by Marina was the closest thing

to flying to Italy to eat dinner. The catered lunch was something of a shock. It turned out OK since after the house full of guests left, we still had time to enjoy Marina's excellent kitchen skills before flying back to Richmond later that evening.

Peter's guest list for his impromptu day-long summit was as varied as Peter's interests in TVRO. It ran the gamut from the top execs at Cooper-Cable, a leading MDS and SMATV operator headquartered in New York, to the President of ECI and Dick Gonzales of DX. It included FM America inner circle member Scooter Jolly, SPACE'S Chuck Hewitt, Holmes Hardin of Canaan Communications, and Shaun Kenny of Boresight. There were more than 20 in all, and only a few of those invited were unable to make it (including, unfortunately, some people from Showtime). As our special report focuses here this month, Peter brings people together who perhaps might not meet.

Peter unwittingly played a part in my first date with Pat Hatfield (now Patti Cooper). I shared that with Marina and Peter when Patti and I visited them in April. It seems that back in late September, when Ted Turner was holding a gala party at the Dorchester Hotel in London to kick-off his CNN-Europe service, Peter was planning to be in Italy. "Why not fly up to London, and meet me at the party?" I suggested to Peter. He liked the idea and we worked out the details; I would meet him in the lobby of the hotel about an hour before the kick-off of the party. My plans were to fly from Provo to London, via Miami, in an 18 hour marathon junket, catching a few hours of sleep at a hotel and then go to Turner's party with Peter.

Not crazy about going alone across the Atlantic, I had invited Pat Hatfield to go with me. It would be our first date and we were both excited about it. In fact, when Pat learned she was going to attend a 'diplomatic level gathering' she went out and purchased one of the world's 10 great dresses, matching shoes, and so on to go with it. I neglected to warn Peter that Pat would be with me; I like surprises.

Pat left Richmond for Miami at mid-day. We were to meet in Miami around dinner time at the airport, go to British Air and check in for London. There was a small hitch; the airplane I was scheduled to leave Provo on, coming first from Miami, never left Miami. In other words, I was stuck on Provo with no way to get to Miami. No way. Pat, meanwhile, had left for Miami. She would arrive there and find me no place in view. Our first date was not off to a very good start.

Arriving in Miami and finding me not there, Pat went to British Air and checked in. And waited. She finally got a message from me advising her only that my plane did not fly. The rest of the message was lost in transit. What did it mean? Just minutes before the plane was to leave for London, she decided to pull off her baggage and return to Richmond. I, meanwhile, was on Provo feeling very frustrated. Peter was in Italy, preparing to fly to London. In the end, only Peter would attend the Ted Turner inaugural party. I would be stuck on Provo as the party got underway and Pat would be back home in Richmond wondering what to do with one of the world's 10 greatest dresses.

So Peter missed my surprise entrance with Pat, and I missed the look on his face and what had to be a great reaction to seeing Pat and I walk into the Dorchester lobby with no warning. Peter has several other memories of his long wait for no-show-Cooper in the lobby of this posh London hotel. It is populated by a particular group of very wealthy people from a specific corner of the world, when they visit London. Peter was amused to see several of these 'filthy rich people' sitting in the \$10,000 chairs in the lobby calmly cleaning their toes with gold plated pocket knives. Ask him about it sometime.

Coop/continued on pg. 23



# The 'Sutro' Equation

Through the relatively short life span of the home TVRO industry there have been only a handful of individuals who have directly impacted the direction or speed of the industry's development. A few, such as Taylor Howard, are self-evident and obvious. Many more are virtually unknown except to a small, select circle of 'insiders' who have occasion to deal with the industry's power players on a day to day basis. Perhaps one of the most underrated, and least appreciated, individuals serving the industry is Peter C. Sutro of Bernardsville, NJ. Sutro appears on our front cover this month, our own token recognition that his efforts on behalf of the industry have not gone unnoticed.

Peter Sutro entered the industry during 'the second wave' period, in the summer of 1981. The Trade Show at the time was in Omaha, and the industry was very much bound up in the technology of rapidly lowering receiver prices and ever more sophisticated equipment. Sutro had acquired a dish from a firm in Tulsa, Oklahoma, that had pioneered position-memory antenna controllers (SatFinder) and from that introduction to home TVRO had become totally fascinated with their potential. He wanted to become involved, and in his background was the marketing of MDS (point-to-point television microwave) services in areas such as New Jersey and New York. Sutro thought he saw a 'niche'; something he was uniquely qualified to do. His target was the sale of premium services such as the The Movie Channel to motels, hotels, and other bulk users. He formed a company with trusted friend and technical wizard Bill Heavener to market software (programming) through TVRO dealers to overnight lodging firms.

Part of the Sutro plan included helping the then neophyte dealers better understand the technology of satellite reception and its marriage to cable distribution. This portion of the industry would later become known as 'SMATV' or Satellite Master Antenna Television. Sutro was practicing this art before it had a name.

In his MDS distribution business, Sutro contracted with firms such as HBO to deliver their services into multiple dwelling or lodging quarters. He found many motels, apartments, and condo groups throughout the populous northeast that wanted premium channel service but who did not know how to go about getting it. These were largely places located where cable service was not available. Where Sutro could pick up MDS transmissions from transmission sites such as New York, he employed the 2.1 GHz point-to-point technology to deliver the signals into client quarters. Not all locations could be reached with MDS. "Why not via satellite?" he wondered. He shortly found out why; firms such as The Movie Channel were reluctant to allow individual motels located outside of cable or MDS areas to sign up for direct satellite service. Sutro, with the background of being in the business and providing thousands of subscribers to these firms monthly, went to work on getting those policies changed.

Virtually single-handedly and fighting cable programmer bias against direct satellite delivery, Sutro slowly changed some corporate minds. He recalls that the first such locations turned on for satellite feeds were done with unusual restrictions. The premium services insisted that he (1) install an MDS receiving system, even though no MDS service was possible, and then (2) 'back it up' with a satellite dish. Of course, the backup system became the primary system since a lack of coverage and 'line of sight' prevented any MDS reception. Many of his early written contracts between his motel or apartment cli-



**1) Dish Farm/** Atop a small knoll in suburban New Jersey, Sutro's backyard looks like a small antenna farm. Here, new Laux C and Ku, Stolle Ku and Harris C-band antennas vvy for attention.

ents and the software programming he was representing clearly spelled out that service was via MDS when in truth the service was via satellite.

It was this program that Sutro attempted to take nationwide, through the pages of CSD and elsewhere, to encourage TVRO dealers with an eye towards the future to become more involved in professional, commercial installations. Using his own growing business in New Jersey and New York as a test bed, he worked out the policies and techniques required to make the new business fly and then passed those techniques along to TVRO dealers affiliated with his organization. He backed this up by forming a distributor relationship with DX Antenna and others, offering SMATV type hardware. Alas, the program fell on hard times as the SMATV world grew up and cable operators became more vocal in their opposition to allowing anyone (other than themselves) to sell the programming services. Sutro had to eventually close the business largely because he was simply ahead of his time with a concept that would prove viable several years later.

Sutro was also a pioneer in many other areas, and because he willingly shared his experiences with others through appearances at trade shows, through CSD and more recently on television programs such as Boresight, he became something of an educator within the field. For example, his forays (first as vacations, later as 'busman's holidays') into the eastern Caribbean led to his pioneering TVRO reception with relatively small dishes for areas such as St. Marteen. When Sutro first visited St. Marteen four years ago, there was a single (privately owned) 7 meter dish there. When he left after his first visit, there were several 12 footers providing good reception. Today there are hundreds more.

Peter Sutro is generally recognized as the creator of the shared dish garden-apartment DBS concept; using a small dish in the 6-7 foot region for 'community reception' from, say Galaxy 1, and then piping the signals throughout a complex in the 400-900 or 900-1400 mHz (IF) band(s). His interest in this subject, and his wide discussion of the technique, probably did more to push forward shared reception systems than any other single activity in this area.



Then there was Peter Sutro in Europe; Italy, to be precise. With a direct family connection to Italy and his annual visits to northern Italy it was not long before Sutro was exporting American satellite technology to Europe. In recent years he has been a lone representative at many a trade show in Europe for American TVRO, introducing Europeans to such items as the Stolle 6 foot antenna and a wide range of American as well as Japanese built TVRO products. Today he formally represents several American firms in Europe with a growing feel for the export of American technology to Europe. With a close tie to his own European heritage, Sutro has a leg up on others who only travel there as tourists.

More recently, Sutro has turned the technology exchange with Europe into a two-way street, bringing some interesting European products to America for distribution. One TVRO related product is a series of sub-band or 'T-Channel' modulators. These are special modulators operating at frequencies such as 7, 13, 19, 25, and so on mHz. Because the coaxial cable losses at these (very) low frequencies is so low, a 'T-Channel' modulator can be used to run television channels through more than a mile of RG59 type cables before more signal amplification is required.

Sutro and super-tech Heavner conceived a cable distribution system using the 'T-Channels' to carry premium programming such as HBO within an apartment complex. The idea is that TV receivers do not tune in these sub-channels, not even the most modern of digital, step-tuned TV sets. A converter must be used. To Sutro, that suggested a way of distributing 'hidden' or premium quality TV channels within a complex, using the same distribution system as is already carrying normal VHF (plus mid or super or UHF band) signals but hiding the new special signals in the process. By using special signal taps and special (block) up converters, Sutro worked out a way with Heavner to distribute low cost premium channels for pennies per outlet. And the 'European connection'?

It was in Italy that he found a manufacturer willing to produce a professional series of modulators for the T-Channels for prices far lower than US manufacturers would match. His first attempt was stateside, but he found large prices and 10 plus week delivery cycles for these special products. In Italy, he found 10 day delivery (to the states, no less!) and prices often a half of those quoted in the states. He is now doing a brisk business bringing in T-Channel modulators, set-top up-converters and the special bits and pieces needed to work these sub-channels.

### THE SPACE Connection

Perhaps the most important contribution of Sutro since he entered the industry in 1981 would be his voluntary involvement in SPACE. Peter served early on the SPACE Board of Directors as an elected member of the SMATV community. He was instrumental in urging that SPACE pay attention to SMATV matters and put in hundreds of hours free of cost to keep SPACE active in SMATV matters.

It was his activity behind the scenes, as a quiet, common-sense filled mediator that has produced the most striking changes in our industry. Until now, there has been no formal recognition of Sutro's efforts for us all in several critical areas. At the risk of betraying many confidences, we'll recount a few of them here for you.

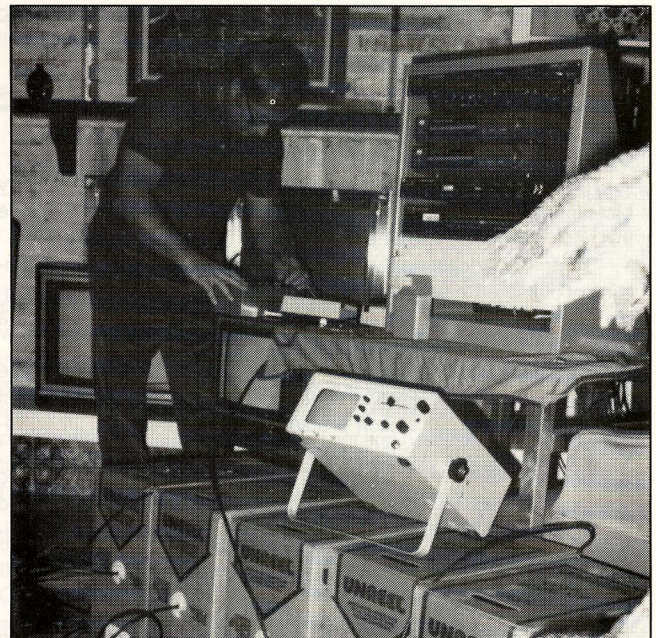
- 1) The Schneringer Affair. You may recall that in 1983, trade show operator Rick Schneringer (STTI) and SPACE got into a legal tussle over who had the 'right' to put on trade shows. SPACE lost their legal right to the name SPACE in that tussle, although Schneringer eventually gave it back after the fighting was over. Sutro played a major role in getting SPACE and STTI to stop their battle. How he did it is less important than the fact that he brought the two sides together, in a spirit of cooperation. Others such as Chris Schultheiss of Triple D played major roles in getting this in-fighting resolved, but Sutro made it possible by taking the first steps in mediation.
- 2) The HBO Affair. Because of his unique posture as an MDS

operator and a fellow with access to the upper echelon of Home Box Office, there was a period of approximately one year (1984, notably) when Sutro's inner-circle contacts with HBO made it possible for direct dialogue to continue between an increasingly hostile SPACE and an increasing defensive HBO. This was an era when SPACE and HBO would have gladly resorted to dueling pistols at dawn if Sutro had not always been standing nearby to urge cooler heads and actions. Once again, he brought people who disliked one another extensively together and kept the two sides talking at the bargaining table. Much bloodshed was avoided by Peter's handling of this period.

3) The Lamonica Affair. More recently, extending perhaps to the present time, Peter has attempted to defuse the hostility generated by satellite talk show host Keith Lamonica towards SPACE. Nobody talks to Lamonica directly and wins points, but Peter has been able to meet quietly with many of the key Lamonica supporters and backers to urge a moderate role. He has done this on his own, not as an 'agent' of SPACE, hoping that if the kind of language one hears on Lamonica's program moderates, more rational heads will prevail. The tally is not all in on this one yet but quietly, behind the scenes, Peter Sutro has been able to work towards keeping a lid on an explosive situation.

Through these and dozens of other voluntary involvements by Sutro through his satellite TV years there is a continuous thread of achievement. His manner is quiet, and he is never forceful. People find him easy to talk with, and sympathetic to their needs and concerns. That makes him one of the better listeners around. His list of contacts and personal acquaintances is impressive and he willingly drops everything and travels halfway around the country or world to sit and talk over a problem.

Every industry needs a 'Peter Sutro' but few have them. Home TVRO, SMATV, and DBS have the services of this dedicated man who has devoted the last five years of his life and his family's life to satellite communications. Peter's work has touched each of us at one time or another, and we are all the better for it.



2) SUTRO'S partner Bill Heavner demonstrates how effective the Italian T-Channel modulators are by running their output through nearly a mile of RG59/U (center) in a living room demonstration at the Sutro antenna farm this past April.



# HOW WTBS INTENDS TO MARKET CNN TO TVRO

### JUST Ahead

When Ted Turner appeared before the home TVRO industry during the Orlando (FL) SPACE convention (November, 1983) he assured our industry that his services (CNN, CNN-Headline, WTBS) would be priced and distributed in a 'home TVRO friendly' mode. He reminded those attending that he was a pioneer owner of a TVRO system (1976) and he (too) had struggled to prove the worth of a new, untested concept in American commerce (the super station, later CNN).

CNN and CNN-Headline News are presently scheduled to begin closed-key scrambling (Galaxy 1, TRs 7 and 8) on July 1st. The third Turner service, super station WTBS, will follow but as we shall see, the exact date has not yet been established. In this report, we'll look at what it means to be a Turner (and WTBS) 'cable affiliate' authorized to resell home TVRO service in your market area. We feel that knowing the terms and conditions which the cable systems will resell Turner under will make you better equipped to deal with the reality of the Turner satellite offerings.

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***"(SSS) intends to scramble WTBS as soon as licensing and copyright reform have established a legal mechanism for TVRO distribution of WTBS..."***

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### OPENING

Turner Broadcasting System, Inc., in the hands of VP Terry McGuirk, mailed a 'Dear Affiliate' letter to all cable (etc) affiliates late this past November. The letter set the stage for scrambling by noting:

"Turner Broadcasting System has committed to the timely scrambling of our satellite signals to support you in an increasingly challenging marketplace. (We) are confident that together we will achieve a smooth transition to scrambling."

The timetable planned last November called for Turner to scramble both CNN and CNN/Headline service on July 1st (1986). Even last November, the 'super station problem' was apparent to Turner; regarding WTBS, the material sent to cable affiliates stated:

"Southern Satellite Systems (Tempo) has told us it intends to scramble WTBS as soon as pending compulsory licensing and copyright reform have established a legal mechanism for TVRO distribution of WTBS."

### THE WTBS Problem

In the interim, the WTBS/super station problem(s) have not been resolved. Here is how they shape up.

1) Super stations do not, directly, deal with cable or other affiliates. FCC rules prevent that, so an intermediary company called a 'common carrier' must be formed to act as an 'agent'

for these stations. In theory, there can be no business relationship between a common carrier and the super station it sends nationwide.

2) A common carrier is exempt from the provisions of the US Copyright law; cable systems themselves pay an annual fee into a 'copyright pool' when they carry (on cable) a 'distant' broadcast signal such as WTBS. The cost per subscriber per month can amount to close to a dime per 'super station' on the average, for copyright. Common carrier firms are exempt from the charges of copyright but only because they do not sell directly to the ultimate user/viewer; only to an intermediary firm (the cable system).

3) If a common carrier were to offer its service (delivery of WTBS, or WOR etc) to an 'ultimate/final viewer' (ie. a home TVRO) the common carrier would run the risk of losing its exempt status for copyright. Sums of money greater than what it now receives for service as a common carrier are potentially at risk here.

4) For this reason, no super station can be presently viewed by a home TVRO viewer through a scrambled service marketed by a common carrier or other programming retailer. Unless somebody is willing to pay the costs of copyright. To date, nobody has been so willing.

5) SPACE maintains that IF this copyright law does impact the viewing of super stations as WTBS (etc) claim, then the law should be changed. Eastern Microwave (common carrier for WOR) elected to scramble before this issue was resolved, thereby shutting off home viewers from WOR. Southern Satellite Systems (Tempo) (common carrier for WTBS) hopes to put off scrambling of WTBS until the issue is resolved, thereby allowing home viewers to continue to watch WTBS pending resolution of the Catch 22 problem.

So what is the proper 'attitude' to have relative to the consumer question "When will WTBS (or other super stations; WOR excepted) scramble?" Probably the best response would be:

"All of the super stations have indicated they will scramble. However, there are legal problems with their scrambling and until those legal questions sort out, most have decided not to scramble. For now, only one (WOR in New York) has scrambled. Another New York City super station channel, WPIX, has not scrambled and says it will wait. "This avoids the complicated common carrier/super station/copyright scenario which even those inside the business find difficult to assimilate.

### WHEN WTBS Does Scramble

There has been little attention to date focusing on the actual mechanics of the handling of scrambled signals by the programmers and their agents; the cable firms. Careful study of the contract, provided by Turner Cable Sales to its cable affiliate agents, gives us some indication of what to expect.

A contract between Turner and affiliates establishes the rights and



privileges for both parties. It defines what Turner expects to do in selling and promoting its services, and how much 'freedom' the cable affiliate agent has when reselling Turner programming in the marketplace. It also establishes the ground rules for the cable affiliate in his/her dealings with the ultimate TVRO consumer. The latter is of special interest to us since there is likely to be some similarity between Turner's handling of cable agent to consumer affairs and the way other cable programmers treat the same situation. Remember, as you read this, everyone in business tries to protect their own 'turf' and some of what you as a TVRO dealer might deem to be 'consumer/dealer unfriendly' is simply good business for the seller of the service(s).

In its cover material to affiliates, Turner characterizes the move to scrambling as "a new business opportunity" for the cable system. Turner points out that "access to satellite cable programming is the primary driving force behind backyard dish proliferation. (And) while others have viewed this with alarm, others see an exciting, new opportunity."

Turner envisions the cable affiliates selling the Turner services (less WTBS initially, as we shall see) as either part of a broader package of services or on a 'stand alone' basis; in other words, CNN plus CNN Headline combined with services such as ESPN (etc.) or as simply CNN (only) service. There is a concern at Turner, reflective probably of similar concerns at other cable programming shops, that in the offering of the Turner services the cable affiliates do not 'play down' the 'importance' of Turner programming. In other words, Turner wants 'top billing' for its services in the promotional efforts of affiliates. The affiliate contract reads:

"In any TVRO promotion, (Turner services) will receive at least equal emphasis with other services offered (by the cable distributor) to TVRO subscribers. (And) Distributor will promote the services as a separate a la carte offering to prospective TVRO subscribers at least as diligently and vigorously as any other offering it distributes on a la carte basis."

That simply means that if our model cable affiliate decides to offer HBO or Showtime 'a la carte' (ie, alone, separate from packaging with other services) it must also offer CNN and CNN Headline separately, and with the same promotional efforts ('vigor'). This is not an insignificant requirement of the contract since the premium services (HBO et al) have a considerably greater visibility on their own.

Turner has offered to cable affiliates a "non-exclusive TVRO distribution right" for CNN and CNN Headline. Affiliates must be 'in good standing' (ie. be current with their payments to Turner). The WTBS question is a difficult one since the contracts now drawn have to plan for the eventual offering of WTBS, through a separate entity; Southern Satellite Systems (the common carrier). Turner foresaw in the contract that CNN and CNN Headline might be offered prior to WTBS through Southern Satellite; and the contract reflects that while cable affiliate distributors will offer CNN plus Headline as a two channel package initially, when WTBS becomes available, it will become a three channel package. The contract notes:

"After (WTBS becomes available), the services will be offered only as a package."

In other words, WTBS will not be separately sold nor will the two CNN services. The fee to be charged is of interest:

"(There will be) a monthly per-subscriber fee of \$1.20 plus any charges in excess of 10 cents lawfully incurred and payable to the owners of copyright in the programming of superstation WTBS because of TVRO subscriber viewing, either through the Copyright Tribunal or otherwise."

That simply means that for the 'basic' Turner package of three channels, the affiliate contracts provide for a charge to the affiliates of \$1.20 per home dish subscriber buying through the cable affiliate, plus any charges greater than 10 cents per month going to the copyright holders. That is thought to indicate that Turner will swallow the first 10 cents per month for copyright.

Prior to the addition of WTBS, the fee for CNN and Headline will be \$1.00 per month. Or it could be higher; there is a provision in the contract to charge the cable affiliate more than \$1.00 if the cable affiliate offers the services for more than \$2.00 (retail) on an 'a la carte' basis. In that situation, Turner wants \$1.00 or 50% of the retail charge, whichever is the greater number.

Remember, these are wholesale numbers to the cable affiliate (distributor). The retail rate can typically be expected to be 50 to 100% higher. There is more; Turner reserves the right to 'abolish the rate schedule' with six months notice and establish new rates. And, if the cable affiliate at any time offers or pays more money for any two other 'basic services' than he is paying Turner for CNN plus Headline, the contract provides for the affiliate to start paying Turner more money as well.

What that means is if the model cable affiliate agrees to carry ESPN and USA (for example) as a package, and he agrees to pay \$1.10 per month for those two services, then his rate for CNN and Headline just became \$1.10 as well. Turner wants the prevailing rate for his service and if the prevailing rate as determined by the marketplace forces goes up, Turner rates go up as well.

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***"Turner characterizes the move to scrambling as a 'new business opportunity' for the cable systems."***

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### AT THE Retail Level

The handling of the retail dish customer has been of some concern since HBO began invoicing or advising subscribers of their 'rights'. In particular, HBO has caught flack because it has been advising consumers that it (HBO) has the 'Right' to make a (physical) inspection of the premise where the (decoder) unit is purported to be located to 'verify' that the (correct) unit is where it is supposed to be. HBO sources state that they must have this ability to ensure that units are not ordered with service for a home location, and then 'moved' to an unauthorized location such as a motel or hotel.

One of the original plans for Videocipher home units worked liked this:

- 1) The uplink control center would have the ability to call up, on the TV screen, a text message whether the decoder user asked for the text or not.
- 2) The text message might be uplinked programmed to say:  
"If you are watching this message in a hotel or motel, there is a cash reward for you if you call 1-800-XXX-YYYY".

The message would only appear on screens of private consumer decoder systems. HBO hoped they could 'catch' those who were moving home units into commercial applications by simply offering a reward to anyone who saw the message on a screen in a hotel or motel. They figured the cost of issuing rewards was bound to be far less than the cost of fielding a national network of field inspection people who would travel all over inspecting home dish systems. And, they could do it without the expected hassle of people who had no intention of letting them 'in their door' to inspect, anyhow.

The plan is not dead; in fact it is ready to implement. A variation of the same plan would have a message that says: "If you are watching this message from outside the United States, call 1-212-XXX-YYYY COLLECT and qualify for a reward of \$100!" Nobody is going to snitch on themselves, of course, from the Bahamas but people watching in-room TV in a Condo in the Bahamas would be tempted (if they could make the Bahamian telephone system work well enough to call out!) to report on the service for a reward.

So there is a master plan in effect to catch 'decoder box movers.'



## TURNER TRIES TVRO MARKETING

In the midst of a 'cable-only' marketing system that shuts out the TVRO dealer and distributor from the sale or direct order-taking for cable programming (software) comes a plan from Turner which would allow dealers to market both CNN and CNN Headline service for a flat annual fee of \$23 per year. Under the plan, approximately ten of the (remaining) TVRO hardware distributors would act as coordinators for the sale of home system through local retail dealers.

Turner thus becomes the first to structure a plan which will allow the TVRO dealers to participate in the 'revenue stream' for the software. The anticipated 'cut' to TVRO dealers is not large (\$2.50 for each \$25 package sold) but the 'message' may be more important than the actual dollars involved.

Turner first presented the plan to TVRO distributors (Echosphere, SVS and approximately 8 others) early in May. The actual part TVRO distributors will play in the program is not clear as this issue of CSD goes to press.

In a related action, Turner's WTBS Common Carrier, Tempo (formerly Southern Satellite Systems) has proposed to Congress that home dish owners pay a regular 'copyright fee' of approximately 13 cents per month for receipt and use of the WTBS service. If Congress accepts this number and moves swiftly on new legislation to allow such charges, exempting the Common Carriers from additional copyright liability in the process, it is anticipated that scrambling of super station feeds (WTBS et al) would move ahead quite rapidly; probably by the end of 1986.

And at the appropriate time, the plan will be implemented. But what about the responsibility of the cable affiliate distributor? How does Turner handle this? The contract reads:

"(The) distributor will exercise reasonable care to protect the security of the M/A-Com system and the codes it utilizes. (The) distributor further agrees that at least once during every year of service to a (particular) TVRO subscriber, it (the cable affiliate distributor) will make such investigation as is reasonably required to determine if the decoder of the subscriber is not being used at the address of the subscriber...and inform CNN of any such occurrence."

And if the cable affiliate does not properly police the location of the decoders?

"(The) distributor agrees to defend and hold harmless CNN, Inc. (from) all claims, actions, suits and judgements ... arising out of theft of service due...in part to distributor's negligence or...to distributor's TVRO subscribers using decoders at an address other than that of the original owner, or for commercial purposes..."

In effect, copyright holders who might wish to bring suit against a decoder user who is mis-using the decoder cannot sue or name in the

***"If you are watching this message in a hotel or motel, there is a cash reward for you if you call 1-800-XXX-YYYY."***

suit CNN, Inc. (including WTBS) because by the contract the cable affiliate distributor agrees to be responsible for the mis-use of the unit.

Some of the suits that have been filed to date are asking damage totaling in excess of \$250,000. That would seem to be a considerable burden to place on the (cable) affiliate distributor in exchange for a potential revenue of less than \$12 per year. And it illustrates the degree

of concern running through all of the scrambling business relationships now being established. Thievery of satellite services is suddenly big time stuff!

When do the dollars change hands? At the end of each calendar month, the (cable) affiliate distributor is to supply CNN with a summary (computation) of the number of home dish subscribers. Payment is due within 30 days of the end of each calendar month. That means that if the cable distributor collects money for June on June 1st, he has until July 30th to make his payment to CNN, Inc. So while the TVRO consumer may be making payment in advance for a full month, the cable affiliate has nearly two months to 'massage' the collected funds before turning them in.

***"A monthly subscriber fee of \$1.20 plus any charges in excess of 10 cents lawfully incurred and payable to the owners of copyright in the programming of superstation WTBS because of TVRO subscriber viewing... ."***

## CABLE Company Prep

With intermittent scrambling (contained within promotional advertising now appearing on WTBS, CNN and CNN Headlines) now underway, how are the cable firms equipping for descrambling? The descramblers began to be shipped during April and in theory all of the authorized affiliates for all three services should now have decoders (VC-2 commercial units). Turner offered the units at a 'special price' of \$385 last November, and offered backup (second) units for \$495 each. Each cable company was entitled to purchase one primary and one spare unit for each service. Turner's position in the VC-2 acquisition program was slight; the orders went directly to M/A-Com. There was an unusual twist, however, which apparently originated with the Turner order.

When a new service, such as Showtime, begins scrambling, the following sequence of events transpire:

- 1) The programmer must notify each affiliate of its plans to scramble, and advise each to obtain a descrambler;
- 2) The descramblers have to be ordered from M/A-Com or a distributor such as Anixter. The delivery of the descramblers has to be scheduled.
- 3) The affiliates receive the descramblers, rack-mount them, and connect them up after their satellite receivers (ie. baseband feeds).
- 4) Then the affiliate calls a special programmer telephone number to have their descrambler 'authorized.' Picture several thousand affiliates all doing this at about the same time. Yes, the telephone lines get overloaded.
- 5) Some of the units don't work (nobody is perfect). The units have to come back out of the rack, go into a box, and be shipped back to M/A-Com. A replacement unit has to be sent out and the process repeats. Finally, everyone is authorized.

When Turner affiliates received their VC-2 units, there was a COD charge of \$42 per unit. Ostensibly that charge would be for freight; it turned out to be more than freight. Turner and M/A-Com decided that with more than 10,000 affiliates out there, they would 'pre-authorize' all of the CNN and CNN Headline descramblers (as well as WTBS). They charged a relatively small fee (approximately \$25) to do this. Now, when an affiliate unpacked the unit and stuck it into a rack, it was reportedly ready to plug in and play. No telephone calls, no defective units.



### Glitches

Although it appears unlikely any 'system glitches' will cause a delay in the now quite certain July 1st date for CNN and CNN Headline service scrambling, Turner has advised affiliates of that possibility. One paragraph in their contract notes: "CNN, Inc. shall cause the encoded service to be transmitted (to the TVRO subscriber via domestic satellite) provided decoders are available to TVRO subscribers nationwide in numbers sufficient to make encoding of the services practicable."

Much to the dismay of M/A-Com, there has not been a serious shortage of VC-2000 decoders to date.

### ***Some of the suits that have been filed to date are asking damages totaling in excess of \$250,000.***

Turner is not totally trusting of its affiliates, having perhaps learned a lesson from the Movie distributors who always demanded the 'right to count the gate' and to monitor attendees at theaters. The Turner contract sales:

"CNN, Inc. shall have the right to inspect, copy, and audit (such) books of account during normal business hours." The distributor, ie. the cable affiliate, must keep track of each subscriber. The system works in an interesting manner:

- 1) Before Turner begins accepting orders from affiliates for home viewers, they (like Showtime and others) ask for a 'zip-code list' for the areas franchised to the cable company.
- 2) Each time the cable affiliate turns in an order for service and requests computer authorization of the terminal (remember that each decoder has its own electronic address, sent out via satellite as an authorization code), before the computer will accept the order for service, it checks the original cable affiliate's 'zip-code-file' to verify that the zip code of the TVRO customer matches one of those zip codes.

### ***Units are pre-authorized by M/A-Com to avoid one by one authorization at the time the scrambling tests begin.***

In other words, the computer wants to know that the customer the cable affiliate has sold service to is located inside of the zip coded region which the cable affiliate is franchised to serve. One way to 'fool' the system is to simply turn in the totally complete address of the TVRO customer but substitute a zip code in your franchise area for the zip code of the actual customer, if he/she is located outside of your area. The ruse created by HBO when they told several smaller cable affiliates to cease selling outside of their own cable franchise district (at rates HBO considered 'wholesale') to TVRO users is the root of this problem. By placing pressures on the more aggressive cable firms they have forced cable distributors to look for ways to 'beat the system' established by HBO to 'police' the sale of programming. Turner has reportedly opted to allow cable distributors to sell anywhere they wish (ie. go 'national'); a perhaps more realistic approach.

### ***One way to 'fool' the system is to turn in the totally correct address but change the zip code to one located within the franchise area.***

#### **CABLE NEWS NETWORK, INC. TVRO DISTRIBUTION AGREEMENT ENCODED SERVICE**

This is a distribution agreement made this \_\_\_\_\_ day of \_\_\_\_\_, 1985, between CABLE NEWS NETWORK, INC. ("CNN, INC."), which owns CNN and HEADLINE NEWS, satellite-transmitted television programming services which CNN, Inc. expects to encode (the "Services"), and \_\_\_\_\_ ("Distributor"), which desires the right to distribute the Services in encoded form to TVRO Subscribers in certain portions of the continental United States. Accordingly, the parties agree as follows:

#### **1. Definitions:**

(a) CNN means a 24-hour per day professionally produced service generally consisting of national and international news, sports, finance, weather, features and such other programming as may be selected by CNN, Inc. for inclusion from time to time.

(b) HEADLINE NEWS means a 24-hour per day professionally produced service presenting national and international news, sports, finance, weather, short features and such other programming as may be selected by CNN, Inc. from time to time in a fast-paced format of one hour or less.

#### **Summary**

Turner's CNN and CNN Headline rates are as much as 5 times higher for home service than for equivalent cable service. That is bound to attract some attention from those who feel that programmers are not playing totally fair with the home dish industry. Coop comments on what that may ultimately mean to both dish users and dish equipment sellers elsewhere in this issue.

In theory, while Turner's CNN and CNN Headline are scrambling starting July 1st, and the marketing program through cable (and perhaps other) distributors will begin at about the same time, thousands of dish owners have been 'pre-signed' for the service already. By making arrangements with Turner and with their dish consumer subscriber, some cable distributors are automatically turning on their subscribers the minute Turner begins fulltime subscribers. This procedure may become more commonplace as other services switch to scrambling, alleviating the same crunch which Turner's cable system operators have missed by being 'pre-authorized.'



# ANTENNA BASICS

## Part Three

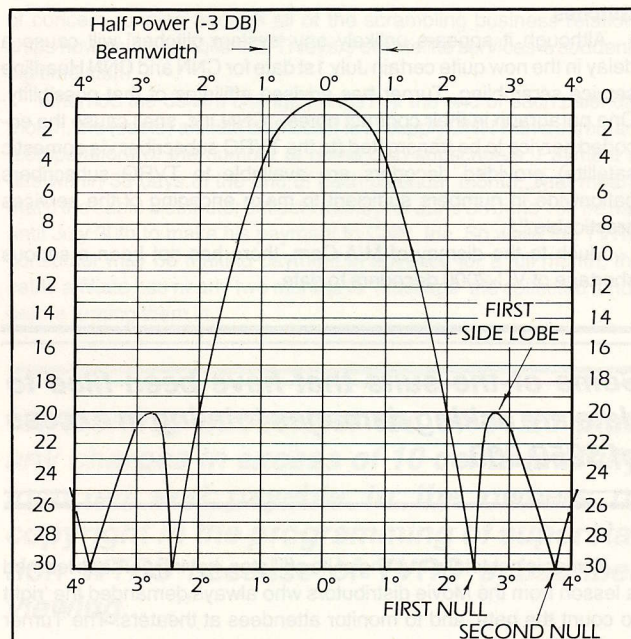
by Jim Vines

### Beyond Brute Gain/Offset Fed Antenna Technology

With reduced satellite spacing forecast uniformly across the Clarke Orbit Belt, one must ask, "How well will those 6, 7, and 8 foot TVRO antenna systems fare?" The higher output powers from the Galaxy 1 (2 and 3) satellites of up to 9 watts per transponder/channel and the selectively higher output on the other newer satellites (such as 8.5 watts per transponder/channel on transponders 3,7,11,15,19 and 23 on RCA's F3R and F4) has certainly made it possible to achieve remarkably good reception with dishes smaller than the 1983 defacto standard of 10 foot diameter. Coupled with this, we now also have improved LNAs boasting noise temperatures of well under 100 degrees Kelvin, improved downconversion techniques (also boasting lower noise temperatures) and a better grip on receiver IF bandwidths, which ultimately results in improved weak signal system performance. As 2 (or even 3) degree spacing becomes more universal, is it enough for system installers to strive solely for threshold-equaling video? The answer, in a word, is no.

Along the Atlantic seaboard and up through New England (plus eastern Canada), some 10 foot dishes are already experiencing some difficulty discriminating between F3R and Galaxy 1. Sloppily constructed 12 foot antennas are also having some difficulty seeing one bird or the other, without seeing some of both at the same time. Some installers mistakenly believe that because they can point a dish at G1, for example, and not actually see a weaker F3R picture drifting in the backyard, that their dish is exhibiting adequate adjacent satellite discrimination. Only in the worst and most severe situations will you actually see a drifting set of video in the background, or a weaker set of adjacent bird transponders laced in between and behind the desired bird transponders. What you do experience, long before you see video interference, is a gradual increase in noise level caused by the signals from the adjacent bird. In the real world, this adjacent satellite signal energy increases the noise threshold in your receiver (system) and causes streaks and sparklies to appear on the desired video. You cannot resolve (as in tune in) this information but its presence detracts from the quality of the picture you are attempting to tune in.

A look at diagram 15 shows the typical profile for a precision-contoured 10 foot antenna. In this example, the  $\pm 2$  degree points for the antenna are 20 dB down on either shoulder of the antenna's main lobe. If we have a situation where the signal strength or footprint of the desired satellite plus the two non-desired satellites on either side ( $\pm 2$  degrees) is equal, the adjacent satellite C-N, or Carrier-to-Noise, ratios will be 20 dB weaker or down when compared to the boresighted bird. However, since the signals from both of the  $\pm 2$  degree satellites are seen by the antenna, the effective strength of the unwanted signal energy is now doubled;  $-20$  dB,  $+3$  dB (the numerical equivalent of doubling the signal strength) equals  $-17$  dB; reference the boresight bird. A quick chat with Al Stem (Director of Operations and Engineering at the United Video WGN uplink station) confirmed that a  $-17$  dB interference level would be a problem that the user would have to deal with.



**Diagram 15 — Idealized 4-gHz Plot For Theoretically Perfect 10-foot Diameter TVRO Antenna**

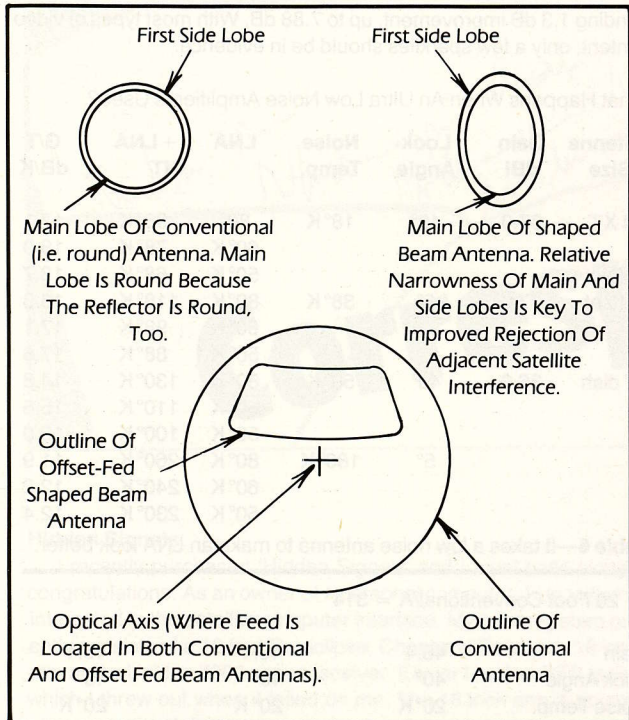
"Video quality, subjective video quality, begins to deteriorate when the carrier to interference ratio or C to I falls below 18 dB," Stem observed. What about those other satellites, the ones that are off boresight by say  $\pm 4$  degrees (i.e. the next set of birds removed from true adjacent)? Stem replied, "Their signal power also must be summed in to the equation."

In our example, the  $\pm 4$  degree points (on the extreme left and right sides of the plot) are down by 26 dB. The sum of both together is  $-23$  dB, for the same reason we reduced the  $-20$  point by 3 dB when we paper-placed two satellites around our boresight satellite. Then we combine the sum of the  $\pm 4$  degree birds ( $-23$  dB) with the sum of the  $\pm 2$  degree satellites ( $-17$  dB) and we find that our total C to I relationship has now decreased to the region of 15 dB. Let's look at some closer-world examples. Let's say we are watching transponder 6 on F3R. It is at least 2 dB weaker than the same transponder on G1 (overlooking that F3R and G1 happen to be alternately polarized so that the same transponders are not directly battling one another). The satellites (G1 and F3R) are assigned orbital spots 3 degrees apart. But you will have that 3 degree separation between the two birds only if you are close to being north of the two satellites; the further east and south your location, as the two satellites drop lower and lower towards the horizon to your southwest, the closer they appear to be together. For example, if your location is southern Florida, the actual difference between F3R and G1 is just over 2 degrees today!

With a  $\pm 3$  degree spacing situation, not modified by the squinted parallax of being around to the side of boresight, our example (10 foot diameter) antenna would find the 3 degree spaced signal energy some 18 dB lower than the boresight energy. This number makes the not always valid assumption that the dish is not contorted (a dish with surface distortion will also have a warped signal receiving pattern), the feed is properly adjusted and the dish is aimed accurately.

The same knowledge tells us that a good quality 8 foot antenna will be likely to have  $\pm 2$  degree spaced signal energy down 14 dB relative to the boresight pattern. The best null or maximum rejection for our 8 footer will fall at a point roughly  $\pm 3.5$  degrees away from boresight. The signal rejection for a set of signals  $\pm 4$  degrees will be about 26 dB.





**Diagram 33** Comparison of a conventional antenna and an offset-fed shaped beam antenna. With the shaped-beam design, the reflector is a rectangular section 'carved from' an imaginary larger parabolic dish. Because the feed structure and its support members do not obstruct the incoming parallel ray 'bundle,' sidelobes are attenuated and more energy is concentrated in the main lobe, resulting in higher gain per unit of reflector area.

When all of the summing is down, allowing for the appearance of two signals (plus and minus 2 degrees; plus and minus 4 degrees) on each sidelobe (left and right), we find that the completed 8 foot C to I will be 9 dB; assuming equal signals and the same polarization of all signals for all five birds.

Not good; and we haven't considered the fate of a 6 foot antenna. Perhaps there is a way out of the woods. That way has been called beam shaping. For more than 40 years now military (and non-military) radar systems have used beam shaping so the concept is hardly new. But, the application of beam shaping to the 4 GHz consumer microwave world has had very few practitioners to date.

Diagram 33 compares and contrasts various aspects of conventional shaped-beam antennas. We will make several generalizations about this diagram:

A) A shaped beam reflector is merely a small section taken out of an imaginary, larger, parabolic reflector;

B) A broad reflector always produces a narrow shaped beam;

C) It is desirable to maintain the shaped main lobe perpendicular to the Clarke Orbit Belt for maximum protection from adjacent satellite signal energy, and hence, interference;

D) And, the relative tallness of the shaped beam antenna's main lobe makes polar alignment less critical. (A topic for future discussion.)

To this point, we have talked about a small offset fed, shaped beam antenna system. One manufacturer to date, Pico Products, has introduced such an antenna. The Pico antenna measures 4 feet by 7 feet and has a published gain specification of 37.0 dBi (which translates to a claimed gain efficiency of 86 percent). Now, 37.0 dBi is a tad shy for most work, but it is 1.3 dB more than an equal-surface-area conventional dish (with blockage from feed and feed supports) is able to deliver. For applications that require a small antenna, this is one of the few apparent ways to have even 37 dBi of gain. (An equally efficient 10 foot antenna would have a gain of 41.5 dBi.)

So far, we have concentrated on the 1.1 or more dB gain that results from offsetting small dish feeds. We have noted too that the near-in sidelobe levels are drastically reduced, promising freedom from adjacent satellite interference. What else does offsetting achieve? Improved antenna noise temperature (due to all-over side lobe attenuation) which results ultimately in improved system G/T.

In earlier discussions, we saw how system G/T and not raw antenna gain is the final determinant of receiver carrier-to-noise-ratio (CNR). We considered a scenario where the lower gain of two 10 foot antennas (equipped with identical electronics) could provide higher (better) system G/T numbers.

Now consider a very good (but totally conventional) 6 foot TVRO antenna's system G/T performance.

$$\begin{aligned} \text{Given: } 40 \text{ degree look angle} \\ G/T &= G_a - 10 \log (T_a + T_{\text{Ina}}) \\ &= 36.0 - 10 \log (50^\circ \text{ K} + 80^\circ \text{ K}) \\ &= 36.0 - 10 \log (130^\circ \text{ K}) \\ &= 36.0 - 21.1 \\ &= 14.9 \text{ dB/K} \end{aligned}$$

The capture area of a 6 foot diameter dish is:

$6(2) \times .7854 = 27.6 \text{ feet}^2$ . Consider now the documented G/T performance of an offset antenna that has slightly less capture area minus 26.5 square feet. The antenna in question is the 4 by 7 foot Pico Kid.

$$\begin{aligned} \text{Given: The same } 40 \text{ degree look angle} \\ G/T &= G_a - 10 \log (T_a + T_{\text{Ina}}) \\ &= 37.0 - 10 \log (18^\circ \text{ K} + 80^\circ \text{ K}) \\ &= 37.0 - 10 \log (980 \text{ K}) \\ &= 37.0 - 19.9 \\ &= 17.1 \text{ dB/K} \end{aligned}$$

The improvement in system G/T that resulted from offsetting the feed is 2.2 dB/K, given a 40 degree look angle. The G/T improvement was greater than the improvement in gain lobe alone because of the offset antenna's lower noise temperature. What happens if both antennas are aimed just 5 degrees above the Earth's blinding thermal glare?

$$\begin{aligned} \text{Given: } 5 \text{ degree look angle} \\ \text{TVRO 'A'—6 foot conventional dish} \\ G/T &= G_a - 10 \log (T_a + T_{\text{Ina}}) \\ &= 36.0 - 10 \log (180^\circ \text{ K} + 80^\circ \text{ K}) \\ &= 36.0 - 10 \log (260^\circ \text{ K}) \\ &= 36.0 - 24.1 \\ &= 11.9 \text{ dB/K} \\ \text{TVRO 'B'—4 X 7 foot offset antenna} \\ G/T &= G_a - 10 \log (T_a + T_{\text{Ina}}) \\ &= 37.0 - 10 \log (38^\circ \text{ K} + 80^\circ \text{ K}) \\ &= 37.0 - 10 \log (118^\circ \text{ K}) \\ &= 37.0 - 20.7 \\ &= 16.3 \text{ dB/K} \end{aligned}$$

The G/T improvement brought about by offsetting already 2.2 dB/K at a 40 degree look angle, increased to 4.4 dB/K at a horizon-skirting



angle of 5 degrees. In Bangor, Maine, for example, Galaxy 1's look angle is 9 degrees. Offsetting can spell the difference between getting little more than sync bars and usable video.

How does a good quality conventional 8 foot dish (area = 37.7 feet(2)) compare?

Given: 40 degree look angle

$$\begin{aligned} G/T &= G_a - 10 \text{ Log } (T_a + T_{lna}) \\ &= 38.4 - 10 \text{ Log } (42^\circ \text{ K} + 80^\circ \text{ K}) \\ &= 38.4 - 10 \text{ Log } (122^\circ \text{ K}) \\ &= 38.4 - 20.8 \\ &= 17.6 \text{ dB/K} \end{aligned}$$

Given: 5 degree look angle

$$\begin{aligned} G/T &= G_a - 10 \text{ Log } (T_a + T_{lna}) \\ &= 38.4 - 10 \text{ Log } (125^\circ \text{ K} + 80^\circ \text{ K}) \\ &= 38.4 - 10 \text{ Log } (205^\circ \text{ K}) \\ &= 38.4 - 23.1 \\ &= 15.3 \text{ dB/K} \end{aligned}$$

At 40 degrees of elevation, the conventional 8 foot dish has a 0.5 dB/K advantage over the diminutive 4 by 7 foot offset design. But at 5 degrees the offset is better by 1.0 dB/K.

From Table 6, it can be seen that a low noise antenna is necessary to fully justify investing in an ultra low noise amplifier. With an antenna noise temperature of 18° K, an LNA upgrade from 80° K to 50° K results in a system G/T improvement of 1.6 dB/K; regardless of antenna gain. But with an antenna noise temperature of 180° K the same LNA upgrade brings a mere 0.5 dB/K improvement.

Antenna NT measurements are taken at the rear flange of the feed, where the LNA is normally bolted on. As ultra low antenna noise temperatures are achieved, the noise contribution of the feed becomes increasingly important. When the antenna's NT is 60° K and the feed's share is 20° K, halving the feed's contribution down to 10° K brings the antenna's total NT down to 50° K. For a TVRO antenna to have a 20° K noise temperature the feed's contribution must be at an absolute minimum.

And the LNA? If it doesn't have an isolator, there is the risk of added noise due to reflected waves coming back from the feed. Even a top quality feed presents some load mismatch (VSWR discontinuity) to the LNA; this creates the reflected wave which bounces back into the LNA cavity out of phase with the original signal. Because of reflected waves (caused by RF escaping through the unisolated LNA probe) the LNA's real world noise temperature can be 20 to 25° K above its rated noise temperature.

Dropping antenna noise temperatures off the chart is an exercise in precision and attention to detail. Even the feed supports merit special attention, not to mention the careful selection of an LNA.

The pioneering work of Pico, Birdview, Seavey, and others, including this writer, suggests an entirely new family of TVRO antennas with applications as yet undreamed of. For example, in the world of international reception via the low signal level Intelsat birds, antennas of at least 20 feet in diameter have traditionally been required for reception of all but the strongest transponders. (See Table 7.)

Consider now the Intelsat reception quality that is possible with system G/Ts in the 26 to 29 dB/K range:

$$\text{Receiver CNR} = \text{Satellite EIRP} + G/T - \text{Path Loss Factor}$$

For our test case, we will assume a saturated global beam transponder whose EIRP at the TVRO site is 22 dBw. We will further assume that our look angle is 20 degrees, for a path loss factor (reference Table 5) of 42.82 (BW = 20 mHz). 20 foot diameter (A = 314 ft (2)) conventional antenna with 60° K LNA (G/T = 27.2 dB/K): CNR = 22 + 27.2 - 42.82 = 6.58 dB. Assuming a real world receiver CCNR threshold of 8 dB the resulting video quality would be somewhat noisy but certainly watchable.

Replacing the conventional antenna with an offset design of equal area should render an estimated system G/T improvement of 1.3 dB/K, to 28.5 dB/K. The receiver's input CNR will experience a corres-

ponding 1.3 dB improvement, up to 7.88 dB. With most types of video content, only a few sparklies should be in evidence.

What Happens When An Ultra Low Noise Amplifier Is Used?

Antenna Size	Gain dBi	Look Angle	Noise Temp.	LNA	+ LNA NT	G/T dB/K
4 X7'	37.0	40°	18° K	80° K	98° K	17.1
				60° K	78° K	18.0
				50° K	68° K	18.7
offset offset	37.0	5°	38° K	80° K	118° K	16.3
				60° K	98° K	17.1
				50° K	88° K	17.6
6' dish	36.0	40°	50° K	80° K	130° K	14.8
				60° K	110° K	15.6
				50° K	100° K	16.0
		5°	180° K	80° K	260° K	11.9
				60° K	240° K	12.2
				50° K	230° K	12.4

Table 6—It takes a low noise antenna to make an LNA look better.

20 Foot Conventional/A = 314 <sup>1</sup>			
Gain	46.4	46.4	46.4
Look Angle	40°	40°	40°
Noise Temp.	20° K	20° K	20° K
LNA	80° K	60° K	50° K
Ta + Tlna	100° K	80° K	70° K
G/T	26.4	27.4	28.0

20 Foot Offset/A = 314 <sup>1</sup>			
Gain	47.2	47.2	47.2
Look Angle	40°	40°	40°
Noise Temp.	12° K	12° K	12°
LNA	80° K	60° K	50° K
Ta + Tlna	92° K	72° K	62° K
G/T	27.6	28.6	29.3

20 Foot Conventional/A = 314 <sup>1</sup>			
Gain	46.4	46.4	46.4
Look Angle	5°	5°	5°
Noise Temp.	42° K	42° K	42° K
LNA	80° K	60° K	50° K
Ta + Tlna	125° K	105° K	95° k
G/T	25.4	26.2	26.6

20 Foot Offset/A = 314 <sup>1</sup>			
Gain	47.2	47.2	47.2
Look Angle	5°	5°	5°
Noise Temp.	20° K	20° K	20° K
LNA	80° K	60° K	50° K
Ta + Tlna	100° K	80° K	70° K
G/T	27.2	28.2	28.8

Table 7—Performance projections for large offset antennas.

Gain and noise temperatures for the offset antennas are estimates. The improvement in G/T due to offsetting at sizes above 5 meters will be less than those obtained with tiny dishes, although significant. Even though there are conventional antennas whose G/T levels slightly exceed those given in Table 3, the offset design still enjoys a substantial advantage.



# Correspondence

### Hidden Signals

I recently purchased 'Hidden Signals' and I must pass along my congratulations. As an owner of a personal computer, I am very much interested in the satellite computer interface. My home system presently consists of a 12 foot Paracclipse, Chaparral Polarotor, 18 inch arm and a Uniden 7000 series receiver. Earlier I had an STS receiver which I threw out when it failed on me. The 18 inch arm is going the same way shortly!

Why doesn't CSD produce its own television show, such as Harry Tootle does on F4, TR24, Sundays from 1 to 3 pm? There is obviously so much information at your fingertips and there must be many people such as myself who own a dish and would like to learn more about the satellite systems. According to the BBS board in Canada, the M/A-Com VideoCipher has been defeated and it was shortly after it appeared on the market. The audio is the tough part, of course, and M/A-Com is reputed to be offering a million dollar reward to the genius who breaks it. My own personal challenge is to decrypt the Russian military signals from Gorizont.

Mike Pompura  
913 Spring Valley Road  
Altamonte Springs, FL

*The defeat of the M/A-Com VideoCipher is often reported, seldom substantiated. A collection of techniques which hot wire the VideoCipher was presented on the Boresight television program Thursday, May 8, between 9 and 10 pm, if you can locate a copy of that tape from a local viewer. The program deals with satellite topics, airs on Spacenet TR17 each Thursday. A second show for satellite people airing on the same transponder at 9 pm on Tuesdays is called Satellite Showtime. Both are produced by elements of the home TVRO industry.*

### Another View

TVRO was booming when satellite programmers did not have to be paid by subscription on top of the advertising costs. TVRO is no longer attractive to many home owners, the result of an expensive per-channel approach which with 10 years of normal use will cost the home TVRO user more money than the system itself did by a factor of four to five.

TVRO is a very large, even rich family, with a natural spirit for survival and the strong desire to overcome the adversity perpetrated by cable television. Let us all concentrate on forming a TVRO programming corporation with each home pledging to purchase \$100 in shares in this corporation, thereby creating a cash flow in excess of \$200,000,000. As soon as such a corporation began to air programming, even if it was but one channel to begin with, the scrambling syn-

dicate created by cable will reverse itself and TVRO will be booming once again. Those programmers considering scrambling will stop and reconsider in an effort to keep the 2,000,000 US homes that are dedicated to the concept of free TV. Let us make this an international corporation because the boundaries of mankind are hopelessly inadequate in the face of satellites and their coverage.

We have the technology and we have the family. We just need a push and an organization to get behind this effort to see it all happen. No, SPACE is not the organization to do this. Frankly, had SPACE been working for cable from the beginning, they could not have done worse for us. I, personally, will be delighted to pledge my \$100 to a new programming corporation in lieu of sending \$95 a year to SPACE.

Francois Moisdon  
4875 SW 28th Avenue  
Fort Lauderdale, FL

*A programming cooperative would certainly go a long way towards reducing the pressure now being exerted on TVRO by cable programmers and distributors. The monopoly or near monopoly position they now enjoy makes for very little competition. Innovation and change are seldom born within a monopoly. They exist to exist, to protect their own status quo. There is a considerable amount of sentiment for an industry backed and operated programming corporation; now, where are the leaders to bring it off?*

### Needs Help

I am an engineer-designer of communication systems, and I am especially interested in TVRO systems. I would like to try my hand at building some of the segments of a TVRO system, since very little equipment of this type has ever been imported into my country. Accordingly, I would like to find sources for the following parts: GaAs-Fets (such as NEC 21889), microwave diodes (such as the A3827 X-band low noise units), hybrid amplifiers (such as the Avantek 8360 LO), integrated circuits (such as the NEC 564 and NEC 5121), and chip capacitors as used in strip-line design. Can anyone help me locate these parts?

Panayiotis Papadimos  
7 Str. Dobioti Str.  
GR 54632-Thessaloniki Greece

*Panayiotis is asking for parts which were in fashion some two to three years ago, indicating that he has somehow come across an older issue of CSD. Here is an opportunity for someone in our technical community to help out a fellow engineer in Greece.*



ESPN  
THE TOTAL  
SPORTS NETWORK

THE NOSTALGIA  
CHANNEL

PLAYBOY  
Channel

THE DISNEY CHA

# Transponder Watch

CABLE NETWORK

CNN

MTV

ESPN

ESPN

**HBO** and USA Network now using TR1, G1 for promotional material feeds, typically not scrambled. HBO materials, when fed, offer opportunity for dealers to display highlights of HBO service for prospective customers in unscrambled environment.

**SPN** (Satellite Program Network) now officially renamed as Tempo Television (TR6, F3R).

**C-SPAN** coverage of US Senate, test for next few weeks, found on TR19 of F3R. If senators find they can live with full-time television service, coverage will continue.

**HORSE**, harness, and other racing coverage largely using Oak Orion scrambling format now available on 12 channels as follows: W5 (TR1) New York Racing Authority; (TR15) Hawthorne/Arlington (IL) Park; (TR20) American Teletbet (Penn National). W4 (TR6) Bay Meadows (CA); (TR11) Meadowlands (NJ); (TR12) Los Alamitos (CA); (TR20) Garden State (NJ). Hughes Galaxy 3 (TR2) Santa Anita (CA); (TR7) Golden Gate (CA); (TR7) Tucson Greyhound (AZ); (TR17) Meadows Racing Network. RCA F4 (TR24) Philadelphia Park (PA). Additional betting/lottery transmissions found W5 (TR1), Ohio State Lottery results; GTE Spacenet 1 (TR7), California State Lottery results. Services operate primarily late afternoon, evenings, weekends, and feed to Nevada betting casinos as well as bookie shops nationwide. Arunta series receivers, stock, decode Oak Orion video for those services not requiring full (encrypted) audio recovery.

**HBO** tests continue for its new Festival Network service, using approximately 10 cable TV systems nationwide. Service is on TR15 of RCA Ku 1 bird and VideoCipher encoded. Movies are selected to be family oriented, less explicit sex, blood and gore of standard HBO fare.

**SPORTING** events not found on ESPN or network feeds most typically are grouped on other occasional use transponders largely reserved for sport feeds. Examples include F3R/TR7 (ESPN blackout channel when normal service is blacked out of a region), F1R/TR7 (Prime Ticket for Southern California pro sports), W5/TR8 (PASS/ProAm Sports for Michigan events), W5/TR15 (Hughes sporting net service nationwide), Anik D/TR2 (TSN/The Sports Network, Canadian version of ESPN), W4/TR11 (World sporting feeds, national), Telstar 301/TR13 (SNS/ Sports News Satellite, national coverage), RCA F4/TR6 (Madison Square Garden Coverage), RCA F4/TR6 (Hughes sporting net service, nationwide), RCA F4/TR9 (Sportsvision, Chicago area sports), RCA F4/TR11 (Home Sports Network, Houston area sports), RCA F4/TR13 (New England Sports net), RCA F4/TR20 (Prime Ticket, southern California sports), RCA F4/TR22 (Home Team Sports, Washington, DC, and Maryland area sports) and RCA F4/TRs 23, 24 (Sportschannel New England).

**DEMOCRATIC** National Party, if it does national teleconferencing during upcoming election campaigns, should be found on W4/TR19 with feeds.

**PRIVATE** or semi-private networks for educational and corporate purposes include GTE G-Star (Ku-band) TR4 (FSN/Florida Satellite News network, feeds between Florida TV stations and markets), TR5

(NTU/National Technological University with courses in electronics and data transmission; 1/2 transponder format), TR8 (Chico State University Satellite Network with courses in computer and data transfer technology). And, GTE Spacenet 2 TR20 (Florida News Network) and TR21 (Texas state news network).

**MTV** alternate is Hit Video USA found on TR18, RCA F4 with 24 hour per day rock music videos softer in content than the original MTV.

**MIAMI** Children's Hospital (305/666-0781) pioneering telemedicine training via Intelsat and (US) domestic satellites to doctors and medical technicians in Central and South America. Typical two-plus hour programs feature interactive audio, one-way video allowing doctors in south Florida to demonstrate medical techniques including operations. Feeds are scheduled in advance and are well promoted and are available to anyone wishing to participate. Intelsat F11, using Global beam transponder is major channel and Peru takes service down and re-uplinks it with (southern) hemispheric beam for smaller dish service required in core of South America. Information from Raul Jordon.

**DESCRAMBLERS?** Different services require different descramblers. M/A-Com VideoCipher descramblers are widely available (see Scrambling Information Channel, W5, TR22, 8-11 pm nightly) or you may call 800/426-3474 to locate a distributor near you. Oak Orion descramblers are sold only after authorization is received from a network using this format. For information of networks currently using Orion, call 815/459-5000. The Fantasy/Fun Decoders can be located by calling 800/221-9096 in USA, 403/454-9784 in Canada or 915/562-3009 in Mexico.

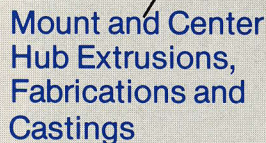
**SOVIET** Union launched 113 satellites during 1985, to 20 for USA. Other nations of the world, plus Intelsat, launched an additional 14 during the year.

**JAPAN'S** first earth resources survey satellite, RES-1, will launch in 1991. The bird will orbit the earth in low earth orbit 15 times per day, have the ability to discern objects as small as 55 feet across, and will inspect the entire globe every 44 days. Mitsubishi Electric is the primary contractor although NEC and Toshiba will be important subcontractors.

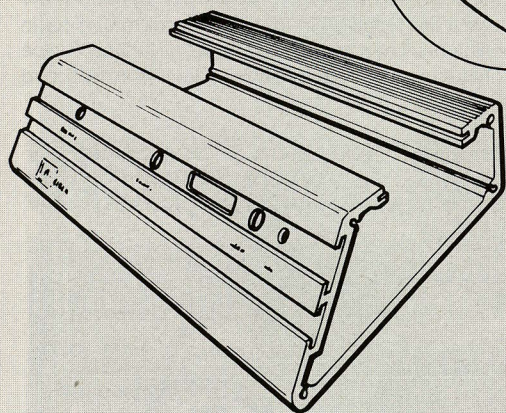
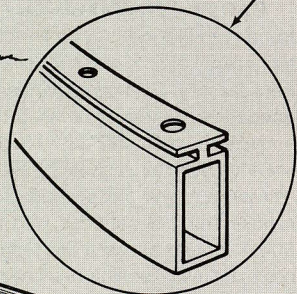
**CHAPARRAL** study concludes polar mounts, if well designed and properly installed, will adequately track geostationary (Clarke) orbit belt. Study sought to determine if the declination offset angles required to make polar mounts track resulted in too large errors for Ku-band antennas of moderate size (to 10 feet). Study concludes it is possible on paper for tracking errors to be held to around 0.01 degree, certainly adequate for Ku-band dishes; but warns that between paper study and field installations there are plenty of opportunities for system designer and installer error. Full tracking charts are available from Chaparral (2360 Bering Drive, San Jose, CA 95131), free of charge.

**MITSUBISHI** expects to produce up to 400 low priced Ku-band ground terminal systems this year with two-way video capability. The \$25,000 range terminals will have antennas in the 1.2 to 5 meter reg-





## Extruded Bent Ribs



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ion, and provide both uplink and downlink capabilities. The primary market for the terminals is expected to be within Japan where up to 5,000 such terminals are expected to be sold for use with the (1988 launch) first domestic birds there.

**NASA** study recently completed found numerous small pits and dings in shuttle orbiter bay windows thought to have been caused by collisions in space with debris from past space missions of US, Russia, and others. Analysis of pits found aluminum shreds indicating man-made, not deep space objects had collided with the shuttle flights. STS-4 mission in 1982 came within 13 km of significant chunk of Soviet Interkosmos (14) scientific satellite.

**VOYAGER 2** will have been in space, operational, for 12 years when it conducts fly-by of outer planet Neptune in 1989. During the actual five hours of useful data collection, more than 200 scientists and technicians will be squeezing every possible drop of information from the satellite.

**US** launches of anti-satellite test objects continues from Wallops Island, Virginia. Typical target vehicles have inclination of near 37 degrees, period of 95 minutes, perigee of 314 km and apogee of 770 km. 95 minutes, perigee of 314 km and apogee of 770 km.

**PANAMSAT** launch, scheduled for Ariane launch in October, will be close. PanAmSat arranged international partnership with Peru in April, clearing way for FCC final approval and Intelsat agreement to allow system to exist as international carrier outside of the Intelsat system. Satellite would have five transponders on board for Latin American boresights, sit at 45 west, and balance of transponders will interlink North America with Europe.

**FOUR** hours per day (night) of International television programming will be fed to broadcast outlets in North America on Westar 4, transponder 19, starting July 24th. ITN (International Television Network) will transmit from 12:30 am to 4:30 am daily programming originating in Europe (UK, Germany, France) to allow broadcast stations to tape materials for scheduling as they wish. Movies, documentaries, and serials will make up the programming mix.

**GALLIUM** Arsenide materials, the heart of GaAs-FET amplifiers for TVRO and many other applications, may be manufactured better, cheaper by 1990. Grumman Corporation and Ethyl Corporation have signed agreement to use 1988 scheduled space shuttle flight to test production of gallium arsenide crystals in virtually zero-gravity realm. Impurities in crystals made on Earth contribute to unwanted operational characteristics, reducing speed, performance and increasing noise figures of devices. Extremely high speed, very low noise GaAs-FET and other GaAs family devices could result, as well as ultimately reduced costs for products.

**GABON**, small African nation, apparently has purchased one of the Intelsat surplus C-band, 36 MHz wide transponders for internal video and telephone linking. Location of transponder has not been released but it is a (southern/eastern) hemispheric channel. Price was apparently in region of \$3.5M (US).

**TESTING** program to verify interference levels of uplink terminals operating with 2 degree satellite spacing is causing significant ripples in satellite community. At issue is how uplink terminals can prove they

are not or cannot cause interference to adjacent satellites. Suggestions include 10 minute testing routine for SNG (satellite news gathering) uplinks, to verify their pointing accuracy before they turn on uplink, to manufacturer certification of VSAT (very small data terminal uplinks) antennas. Larger fixed antennas, such as 10 meters and up, may be ultimately required to turn off uplink for several hours to verify the degree and extent of their radiation towards adjacent satellites.

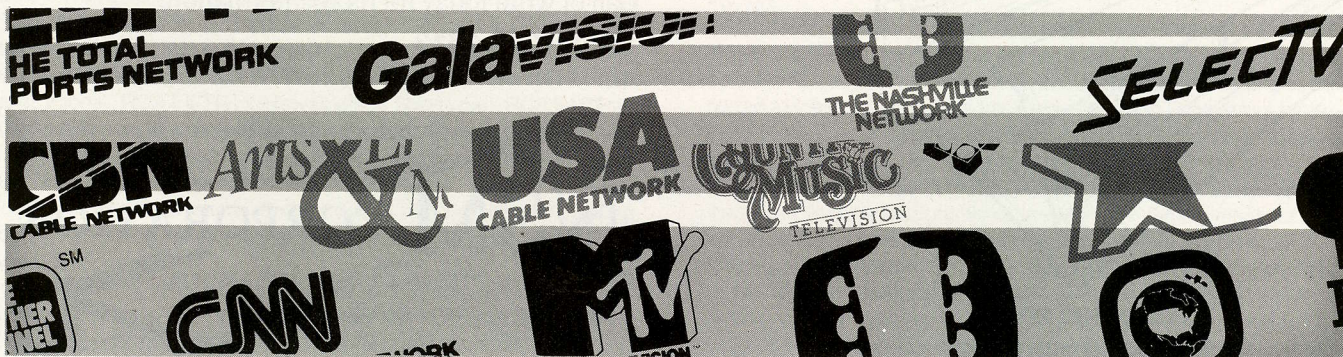
**SENTIMENTS** growing to cancel DBS entirely, doing away with special allocation of 12.2 to 12.7 GHz band for DBS only type services and reopening this 500 MHz segment to FSS (fixed satellite services). Present FSS band, 11.7 to 12.2 GHz, is already suffering because of mandated 2 degree spacing which impacts on the type of uplink terminals and antennas that can be employed. One suggestion is for FSS band to be enlarged to include 11.7-12.7 GHz, allowing birds to operate within 500 MHz segments of band creating effective 4 degree spacing between birds with 500 MHz offset between birds spaced at 2 degrees. This would also require receivers to be capable of covering 11.7 to 12.7 GHz as well as feeds and LNBs, mandating new IF bandwidths of 1,000 MHz to allow receivers to tune in any or all of the channels in Ku.

**FCC** has decided the individual licenses for VSAT terminals will not be required in future, greatly streamlining the licensing process for two-way data and voice network terminals (5 meters and larger) will require separate licensing, and a representative VSAT (small terminal) in system will also have to file complex license application. Additional small transmit and receive terminals can then be routinely installed without individual licenses provided user maintains full records of system for inspection. Users pending include 7-11 (Southland), Wal-Mart, Federal Express, and others. FCC reached similar decisions in 1979 effecting then mandatory licensing for all television and audio-only (ARO) receive terminals.

**CNN** reportedly is providing complete SNG uplink vans for as little as \$175,000 to TV broadcast station affiliates in exchange for certain rights to CNN and other news programming. Concept is that CNN, through newly leased transponders on RCA K2 (2 transponders) and G-Star 2 (3 transponders) will build array of big market TV stations as affiliates to obtain important news coverage out of centers such as Miami. SNG van is part of deal sweetener to get stations to cooperate.

**EARTH TERMINALS** parent Cincinnati Microwave is bucking trend in TVRO industry by announcing significant new top-end TVRO technology at time when other suppliers are leaving field. Firm claims new Starcast System expands ability of home system as Dolby expanded usefulness of home audio systems.

**NEW** spacecraft battery technology may make significant difference in operational capacity and life of satellites by mid 1990s. Called nickel-hydrogen cells, new technology supercedes established nickel-cadmium batteries with 25% more power per cell and up to 300% increase in cell life resulting in improved satellite lifetime in orbit. Japan's Toshiba has been selected by Japan's National Space Development Agency to build first such batteries for use in 1992 bird launch.





Coop/Continued from page 9

**Captain Midnight**

One of the worst nightmares of Home Box Office came true at 12:32 am, Sunday morning, April 27th. Someone, operating a powerful uplink transmitter, purposely jammed the HBO uplink signal to Galaxy 1, transponder 23. The jamming carried a message; using a color bar test pattern as a screen bed and a character generator (electronic keyboard) as a message source, the screen display read as follows:

"Goodevening HBO  
From Captain Midnight  
\$12.95/Month?  
NO WAY!

(Showtime/Movie Channel Beware!)"

The total transmission lasted slightly over four minutes. The signal was as much as 12 dB stronger than HBO's own uplink at the start of the transmission, gradually reducing in apparent level to a parity with HBO at the end. HBO claimed their own uplink operators were able to regain control of their transponder but it was not clear that the transmitter used by Captain Midnight did not simply deteriorate in power as the minutes ticked on.

Videotape of the clandestine transmission instantly appeared on the news networks, including CNN, CBS, and ABC. Only NBC ignored the story early on. The print media, including HBO parent Time Magazine, covered the incident extensively. Captain Midnight became an instant folk hero.

**Why did it happen?**

The message is self explanatory. Someone was objecting to the HBO marketing of their programming to home dish users at \$12.95 per month. That same someone was warning Showtime and The Movie

Channel that if they followed similar marketing and pricing of their services, they too could expect a visit from Captain Midnight.

**Who is Captain Midnight?**

A pseudonym of course. But a special pseudonym. Captain Midnight is a fictional character first created more than a decade ago. He was created as a sort of 'electronic Zorro,' riding about the countryside to 'break into (radio) transmissions' to deliver messages of social significance. Through the years, since his first fictionalization, many people have adopted the name Captain Midnight to interrupt radio broadcasts, CB radio broadcasts, and in the case of a Fort Lauderdale cable system service some 15 months ago, an HBO transmission on the cable system. It is unlikely that over a decade or more, only one person or group has been Captain Midnight. It is far more likely that each incident has been created by someone who identified with the concept of electronic terrorism and that each such occasion has featured its own unique Captain Midnight. It doesn't matter; this particular Captain Midnight is likely to be nabbed in the end, as we shall see.

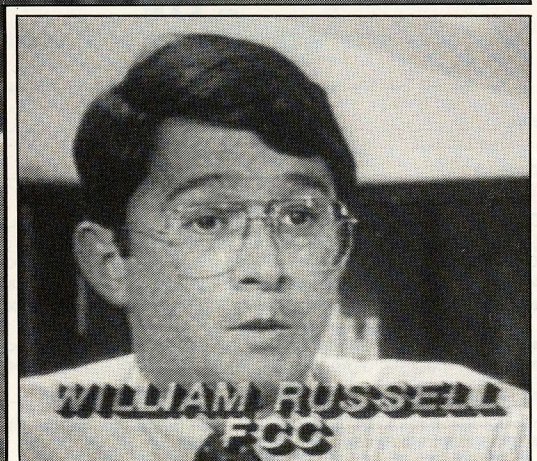
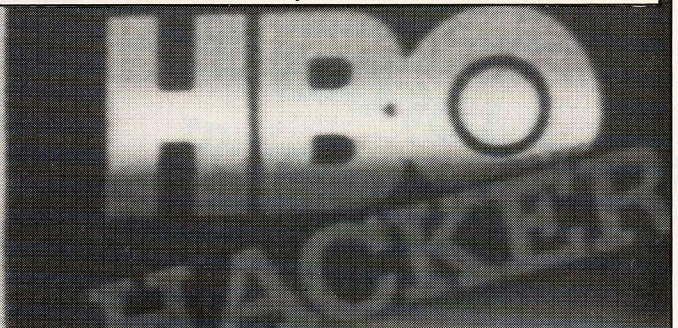
HBO called the interruption of their signal criminal. They did not exaggerate. It is a federal crime to purposefully interfere with the transmission of an (FCC) licensed radio transmitter. FCC rules provide for a fine (up to \$10,000) and a jail sentence (up to one year in a federal pen) for each such incident. If Captain Midnight did this three times, he would be potentially liable for fines totaling \$30,000 and jail terms totaling three years.

In a movie carried by HBO some years ago, called 'Used Cars,' a slightly unbalanced promoter used a portable satellite transmitter mounted in a vehicle to beam a message to the President of the United States via a fictional satellite broadcasting system. It all looked very simplistic in 'Used Cars,' as movies often paint real life. The April 27th incident was far more elaborate and far more carefully planned.



FCC's William Russell explained that it is a criminal act to jam a transmission of any sort; fines up to \$10,000 and jail terms of 1 year accompany each such incident.

CBS called Captain Midnight incident 'HBO Hacker' and warned of threats to national security.



WILLIAM RUSSELL  
FCC



**HBO called the interruption of their signal criminal. They did not exaggerate. It is a federal crime to purposefully interfere with the transmission of an (FCC) licensed radio transmitter. FCC rules provide for a fine (up to \$10,000) and a jail sentence (up to one year in a federal pen) for each such incident.**

First there is the question of power. HBO and other uplink operators operate their uplinks in a carefully prescribed manner. In simplistic terms, here is how it happens:

1) Each satellite (such as Galaxy) has its own threshold level. A satellite's threshold is much like a receiver's threshold. Once you send enough signal to the satellite to overcome the threshold, no additional amount of uplink signal (power) will improve the quality of signal coming back on the downlink. This can also be called saturation, although the two are not always interchangeable.

2) Let's watch an uplink operator tune-up his uplink transmitter. First he boresights the bird on the downlink. When he is certain his dish is pinpointed at the satellite on receive, he turns on his transmitter. He measures the amount of downlink signal he sees coming back from his uplink.

3) Now he turns up the power on his uplink and carefully monitors the downlink signal at the same time. As he increases the uplink power, he sees the downlink signal getting stronger and stronger. At some point as the uplink power is turned up, there is no further increase in downlink power. In other words, he has reached the limits of the satellite; additional uplink power is merely wasted, since it results in no increase in downlink signal (power). This is (also) known as saturation.

4) Now, let's measure the amount of uplink power leaving the transmitter at saturation; 350 watts. In theory, if the uplink operator uses any more than 350 watts, he is wasting power since it results in no improvement in the downlink.

5) However, the uplink operator wants something called reserve to be in the circuit. Suppose a heavy thunderstorm sits over the uplink. That heavy downpour will attenuate or weaken the uplink signal to the satellite and reduce the downlink signal. So the uplink operator continues turning up the power control to perhaps 700 watts; he adds another 3 dB of power to the uplink as a safety valve just in case there is bad weather or another problem. That's where he runs or operates the uplink from that time forward.

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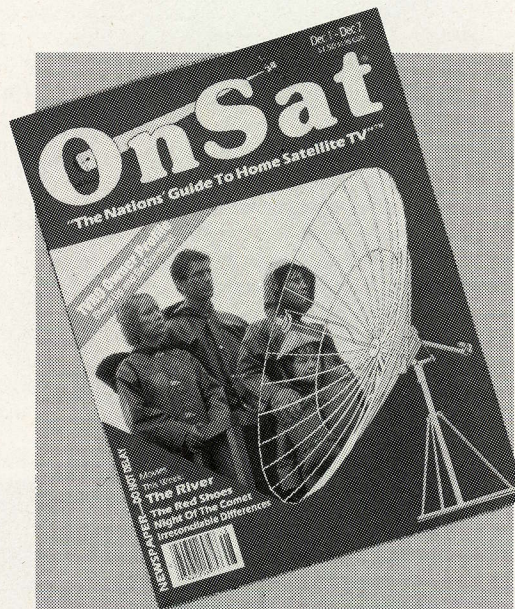
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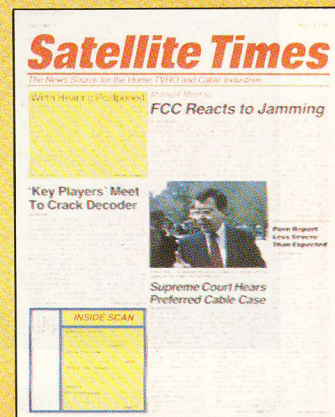
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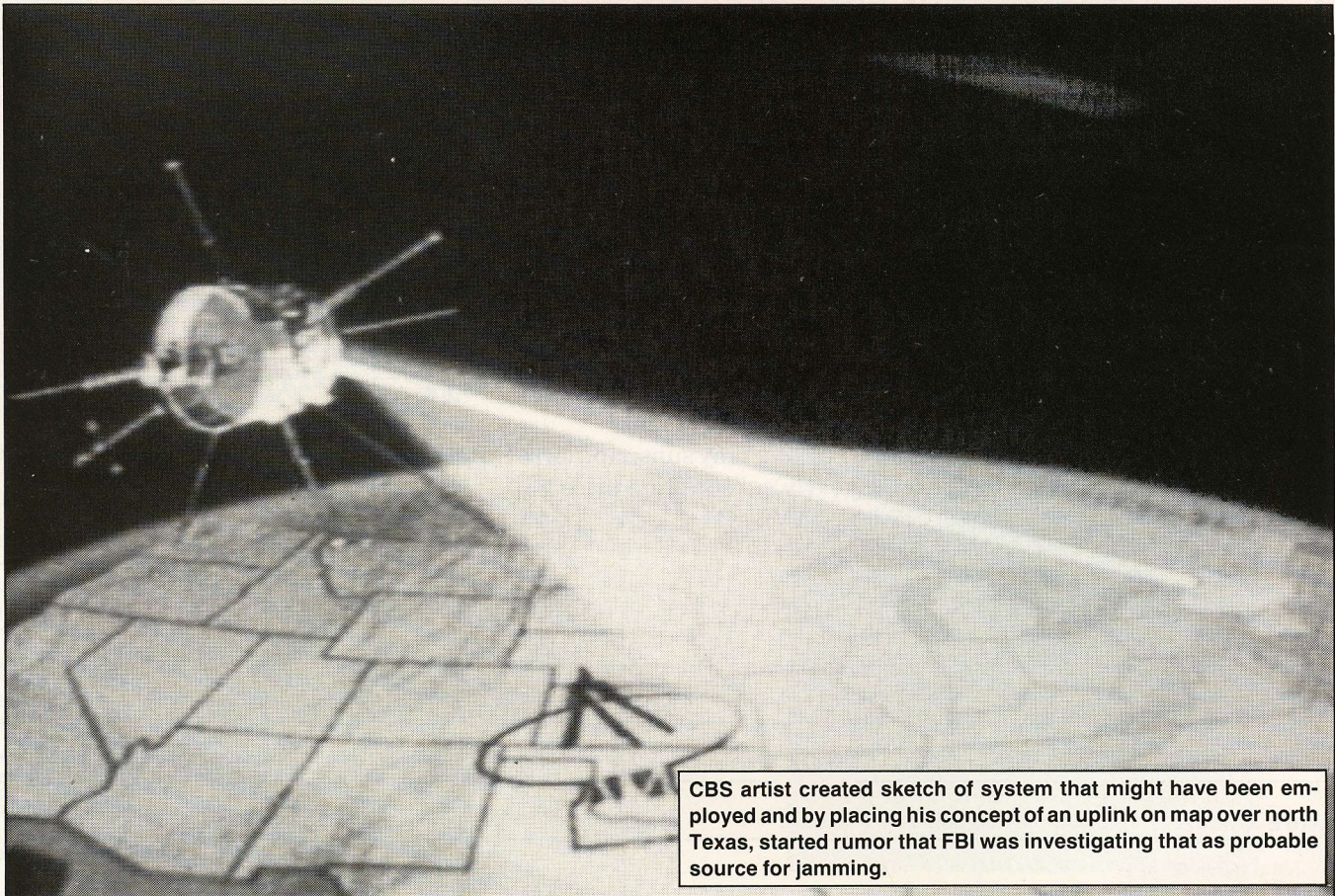
The total power leaving ground on the uplink is a combination of two factors; the uplink transmitter power (700 watts in our example) and the gain of the transmitting antenna. You can express the gain of the antenna in dB and you can express the power of the transmitter in dBw or decibels greater than 1 watt. In calculating the total power at the uplink, you have both variables to play with. If you reduce the

transmitter power by 3 dB but increase the gain of the antenna by 3 dB at the same time, you end up with no dB of change at the satellite proper. It thinks you are using the same power in both situations.

Based on videotapes run by ABC, CNN, and CBS, it is possible to determine the apparent difference in signal level between HBO and Captain Midnight. Since for more than four minutes the signal of Captain Midnight was stronger than the signal of HBO, it was obvious that for some period of time the clandestine transmitter of Captain Midnight had a greater total power than the total power of HBO. CNN and ABC coverage suggested that the Captain Midnight signal varied between 3 dB and 5 dB stronger than the HBO signal. That translates to 200% to 275% more total power for Captain Midnight than for HBO. The CBS tapes suggest as much as 12 dB greater total power at peak points than HBO and that translates to as much as 16 times as much total power for the Captain. It was unclear whether CBS doctored their tapes or not to make them appear cleaner than the actual transmissions really were.

In either case, some conclusions can be drawn about the type of equipment pressed into service by Captain Midnight:

- 1) The total power capability was on a par with HBO. HBO does not normally operate their uplink at maximum transmitter power because of the threshold/saturation situation. It is possible they did react to the jamming by increasing their own transmitter power to overcome the Captain Midnight signal.
- 2) There are approximately 50 antenna-transmitter combinations in North America in the HBO class. This is out of a total FCC universe of approximately 3,000 licensed uplinks.





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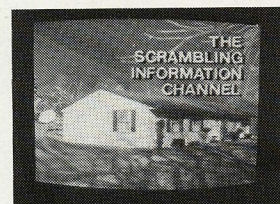
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## SCRAMBLE-FAX

by Bob Cooper

IF satellite scrambling is important to you, here is a single, authoritative source of timely, confidential information of great value; **SCRAMBLE-FAX**. Bob Cooper is routinely gathering all of the important scrambling facts and combining them into a single AIR-mailed 'Newsletter' designed to give you all of the facts you need in one, convenient, timely place.

**SOURCES** for pirate decoders, reports on export problems and equipment interfacing solutions. Advance warning on who is scrambling, when, and how (more than 37 channels have already scrambled; 20 with Oak Orion). All of the important, hard to locate information, in one publication.



**COMPLETE**, up-to-date listings on which receivers interface with the 'E' and 'E/B' version Videocipher descramblers; full table listing or who is scrambling, using which system. Technical tips for interfacing descramblers with commonly available receivers.

**STATUS** reports from DESug (DES Users Group) on progress made in 'busting' the videocipher coding; analysis of plans and books offered in field and value of each to users. Conversion of non-compatible equipment to Videocipher interconnection, and, much-more!

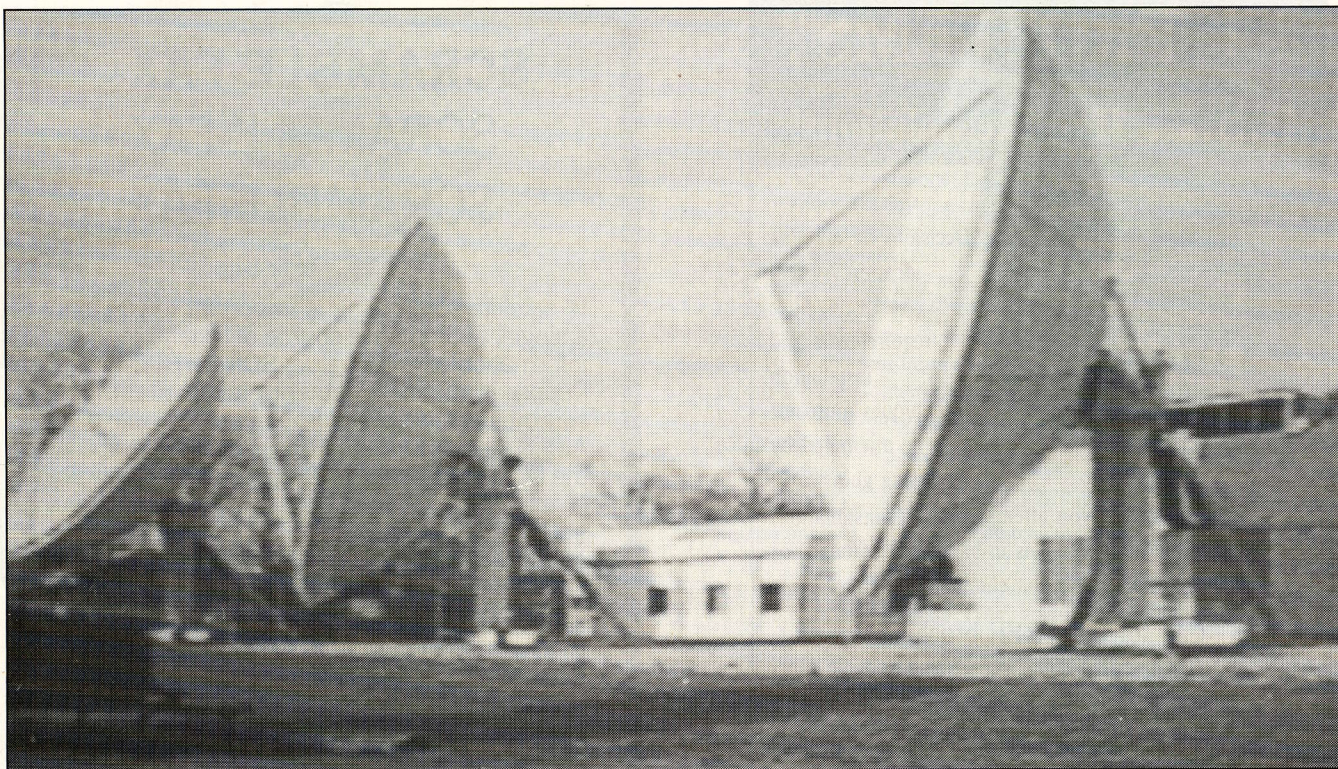
WESTAR Communications/Westcom, the Toronto area alleged manufacturer of 'pirate decoders' for HBO/Showtime and other Videocipher type scrambled services reportedly has been sold to a new group of investors; all Canadian. The firm has been offering their pirate-type decoder unit for \$500 (US) for several weeks claiming it decodes all Videocipher scrambled video plus audio signals. Attempts to locate the firm other than through their 800 telephone number (1-800/265-5675) typically meet with failure and the firm is quick to explain that it would be inappropriate for them to identify their actual street address location (SCRAMBLE-FAX suggests you try 504 Iroquois Shore, Oakville, Ontario; and 416/842-2877 as their non-800 telco).

**AND** you are invited to call 305/771/0575 anytime for a free, 3 minute pre-recorded 'SCRAMBLE-FAX Hotline Update' report; the latest in fast-breaking scrambling news to augment your printed copy of SCRAMBLE-FAX. To order SCRAMBLE-FAX, call 305/771-0505 with your VISA/Mastercharge card number and expiration date. Or send \$10 check or money order to the **CSD** address below.

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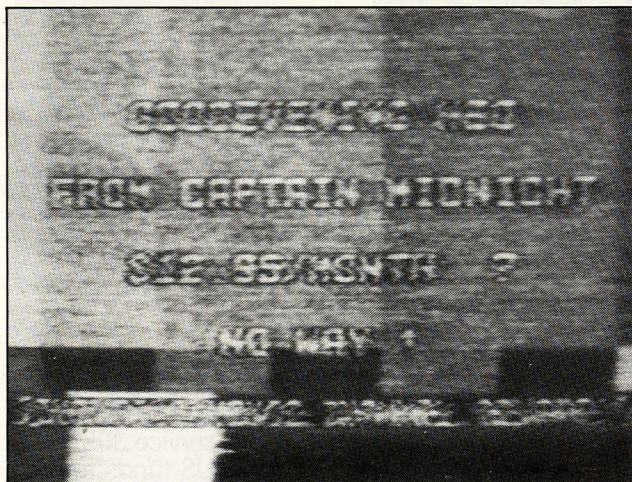




HBO uplink on Long Island uses 11 meter dishes and approximately 700 watts of transmitter power.

3) The combination of a backyard antenna (HBO uses 11 meter or 36 foot uplink antennas) and the most powerful uplink transmitter presently available commercially (in the 3,000 watt class) does not add up to sufficient power to override HBO's own signal, even when HBO is throttled back to the saturation/threshold level.

The Captain Midnight signal clearly came from a commercial uplink; probably no less than 11 meters in size (perhaps as much as 13 meters) and if the CBS videotape was undoctored, with a transmitter power in the 3,000 watt class. Once again, there are approximately 50 such rigs in North America, some of which are in Canada, Mexico, Bermuda, and Cuba.



Footage from ABC and CNN had low signal ratio between HBO and Captain Midnight signals.

#### How did someone get access to such a system?

While 12:32 am EST is not your most popular hour for operating an uplink, on a Saturday night/Sunday morning, it is a busy traffic time. A high percentage of uplinks are in use at that time. Some, like the Nashville Network for example, never shut down, so they would be ruled out as unlikely candidates because of their use for other purposes at that point of time.

All (FCC) licensed uplinks are required to maintain and retain written records of their transmission purposes. While bookkeeping may be sloppy at some uplinks, generally a review of the records, days or weeks or months after a certain point in time, will reveal who was doing what, with an uplink. No, Captain Midnight did not log his own clandestine transmission over the top of HBO but the logs of an uplink station would help clarify those otherwise occupied at that point in time.

So a serious investigation of who and where this transmission came from started with a review, in FCC records, of which uplinks had the physical equipment to do such a deed. That gets us down to perhaps 50 uplinks out of 3,000 FCC licensed. Plus a few more in Canada, Mexico, Bermuda, and Cuba.

#### Now, the video we have all seen.

The bed for the message was a color bar test pattern. They all pretty much look alike; or do they? This one was not your totally-typical test pattern. Notice the smaller, secondary bar approximately 30% up from the bottom of the screen. There are several signatures which make that particular pattern unusual.

A color bar test pattern comes from a piece of rack mounted video equipment, or a TV camera with bars built-in. No two bars are exactly alike; they have a uniqueness not unlike your own personal handwriting. This particular pattern had several unique features. A qualified expert could pick those unique parts out after a few minutes of study. Of the 50 or so uplinks with adequate total power to override HBO, I would estimate no more than 15 have this particular color bar test pattern inside of their facility. The search is narrowing.



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CNN coverage re-coined pirate word much to dismay of home dish industry.

#### And the character generated video; the text.

Some things are obvious; the fellow who typed the message ran 'Good' and 'Evening' together. Sloppy? Perhaps. The phrase on the top line, "Goodevening HBO" has some significance. Telco circuit operators routinely bid each other "Good Evening" with their electronic typewriters just as you see being done here. Does that suggest something about the background of Captain Midnight? Again, perhaps.

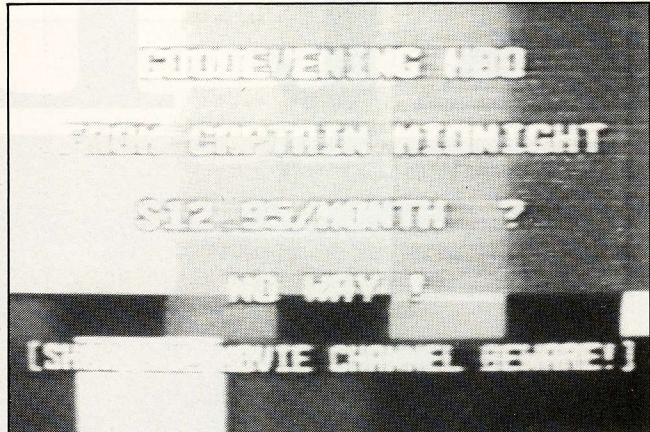
The Justice Department, called into the investigation, believes that the line "(Showtime/Movie Channel Beware!)" is a threat. Not unlike making a threat on somebody's life. They consider that an extra offense to be charged against Captain Midnight, in addition to the act of jamming.

But of all the clues to date, there is something in the characters on the screen which virtually narrows the location of the transmitter system uplink to a single site. That is a flaw in the lettering.

If you take the text apart, a letter at a time, and blow up the text on a large screen display, you can study the make-up of the letters in the message. When you do this, you are going to find that this particular electronic typewriter generator had a built-in flaw. One of the letters used in the text (and used more than once in the message) has a flaw in its appearance.

An example. You forget to clean your typewriter keys and gum and crud builds up on the letter e. The center of the e fills in and it becomes a glob rather than an open circle. Now, if you wrote a ransom note on such a typewriter, each time you typed an e it would leave a tell-tale and unique impression on the paper. There is a similar flaw in the text on the screen; some electronic circuit generating this text was misadjusted and one of the letters (in particular) has an overshoot condition. If I was Captain Midnight, I'd do something about the operating condition of this particular character generator very quickly.

We started off with perhaps 50 potential uplinks and then with the unique color bar pattern (and the condition of the colors on the pattern) we reduced the potential uplinks to perhaps 15 at most. Finally, with the flawed character generator, we reduced the potential number of systems to one.



CBS video showed Captain Midnight signal that was nearly 12 dB stronger at Galaxy 1 input than HBO, leading to speculation that uplink was in monster class and power was some 3,000 watts for Captain Midnight.

Now, is our present generation Captain Midnight an employee of this uplink and will uplink records show he was on hand when this happened, or, did he 'bust in' to use the uplink for his own purposes just after midnight on April 27th?

If our Folk Hero is inside of the US of A, I figure he had better start a Captain Midnight Defense Fund pretty quickly. His days are numbered. If he is in Canada or elsewhere, he may squeak by without being caught. One painless way to get such a fund started would be to distribute Captain Midnight T Shirts and bumper stickers through TVRO dealers, with a percentage of the gross going to the defense fund. If by some miracle (or FBI ineptness) our present Captain Midnight gets away scot free, the fund will probably be needed later on anyhow as we shall investigate here next month.

Media coverage of the event was of interest. So was the way it turned around on us. First at it was CNN because they have more news than anyone else. For the first 12 to 15 hours, they treated it as if it were some sort of college prank. CBS took a more serious view in their late evening news on April 27th, doing an excellent report that pointed out the vulnerability of all American satellites (including military defense satellites) to jamming. ABC expanded upon that concept with their evening news on April 28th and industry pundit Peter Sutro, appearing in a CNN interview on the 28th, casually mentioned the possibility that an uplink such as this could have originated outside of the United States; "even from Cuba," noted Sutro. From that point until the story was pushed out of newscasts by the Russian nuclear reactor disaster, the emphasis was on the 'foreign connection.' The early stories centered on the erroneous supposition that anyone with a home TVRO could have created the interference; not accurate of course, as we have seen here. Eventually the news services found enough experts to clarify the story with more fact than supposition, and for the most part, the suggestion that we did it was lost.

Some good will came out of the incident. The cable programmers now have proof that they are vulnerable; that may improve their attitude at the bargaining table, if we ever get them to a bargaining table. They also have proof of the intensity of people's emotions over their scrambling; that may cause them to rethink their own marketing plans in the future. Congress, meanwhile, has been working on legislation designed to change the rules of interference and eavesdropping on satellites and other communications. This incident, good or bad, may create more interest in putting such a law through this session.

It has also had another effect. For some months there has been serious planning to disrupt the HBO signal and other scrambled signals using a form of transmission called pulsed emission. We'll look at what that is all about here next month.



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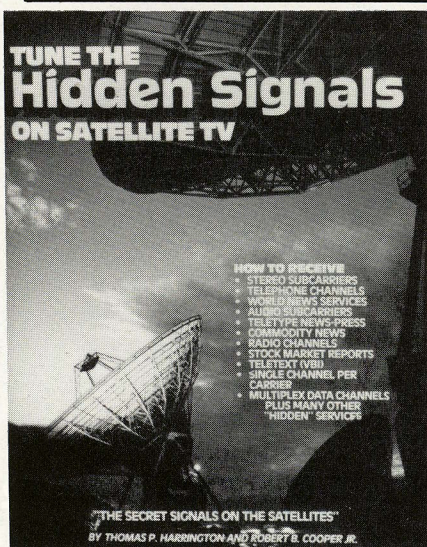
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## Advertiser Index

1. ADM . . . . .	8
2. Avcom . . . . .	Inside Front Cover
3. Bob Cooper . . . . .	3
4. Coop's Subscription . . . . .	1
5. ESP . . . . .	27
6. Fluke . . . . .	5
7. Hidden Signals . . . . .	31
8. Luly . . . . .	2
9. Merrimac . . . . .	31
10. Nema Electronics . . . . .	27
11. NSC . . . . .	Back Cover
12. NSM/Alusas . . . . .	21
13. OnSat . . . . .	24
14. Satellite Times . . . . .	25
15. Scramble Fax . . . . .	27
16. SMIC . . . . .	32
17. STV Prod. Review Book . . . . .	Inside Back Cover
18. Super Guide . . . . .	29
19. Triple D . . . . .	32
20. West . . . . .	31

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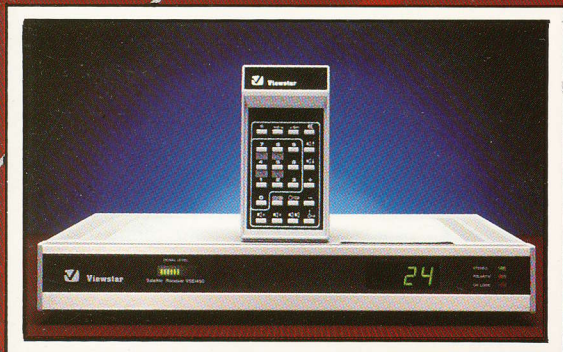
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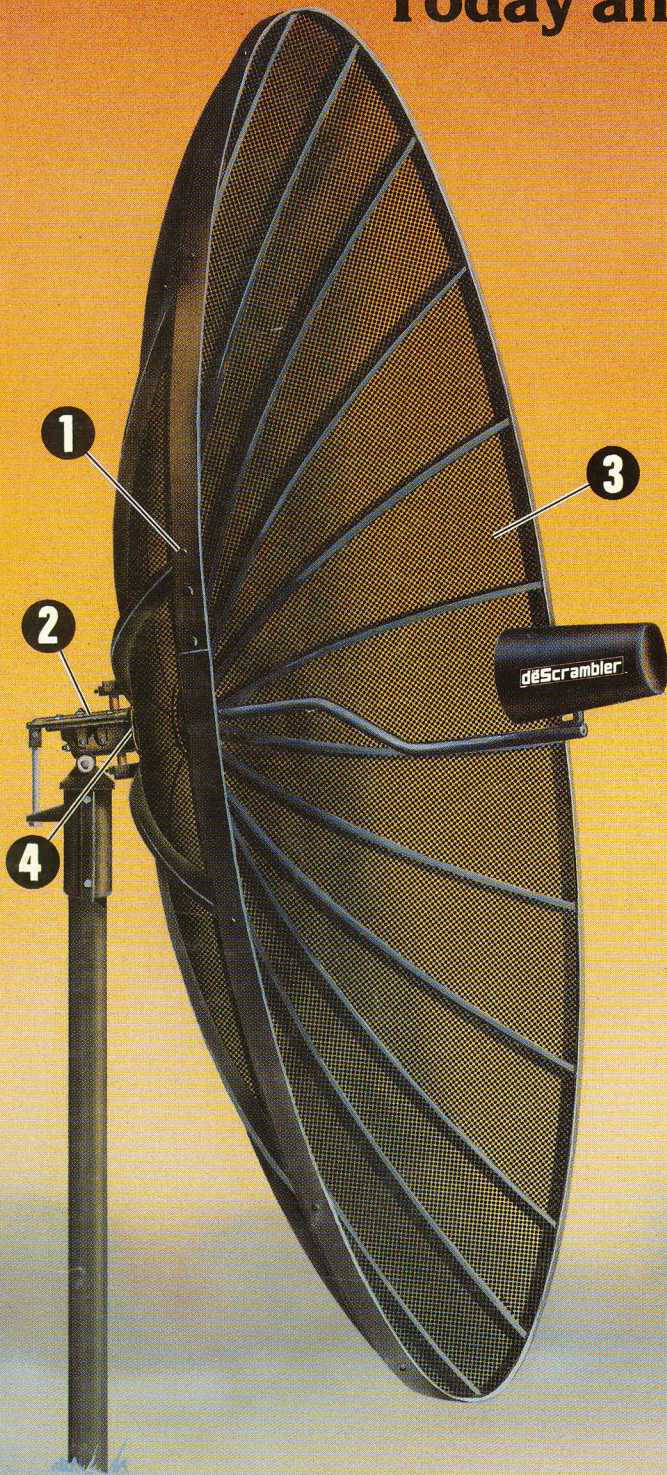
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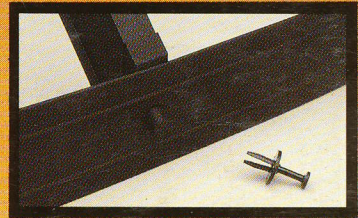




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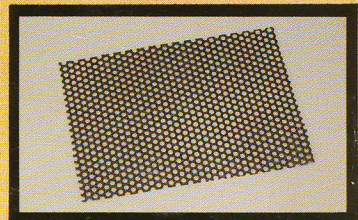
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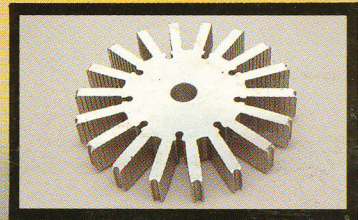
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